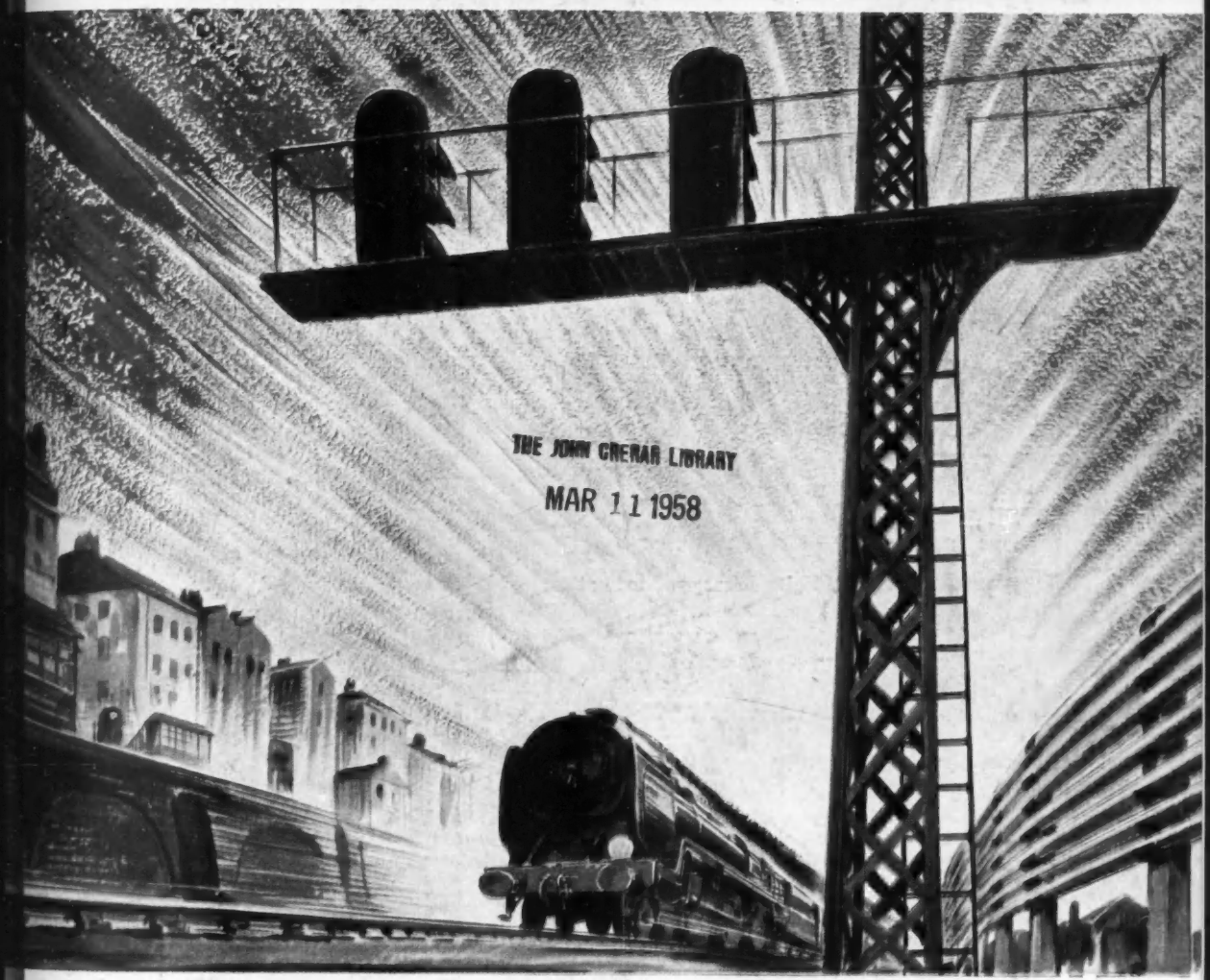
ELECTRICAL REVIEW

6213

FEBRUARY 1958 PRICE 1s 6d



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MAR 11 1958

FOR RAILWAY SIGNALLING CABLES

Paper insulated power cables for working voltages up to 33kV manufactured to British Standard or foreign specifications, with copper or alternatively aluminium conductors.

Mass impregnated non-draining paper insulated lead covered cable.

Cambric insulated cables.

Corrosion resistant P.V.C. sheathed paper insulated lead covered cables.

Multicore cables for railway signalling control and telephone circuits.

Aberdare Cables Limited

DARE, GLAMORGAN. ABERDARE 416. LONDON OFFICE: NINETEEN WOBURN PLACE W.C.1. TERMINUS 2777

TGA 53

Splendid Isolation

Attractively designed cover and cast iron case of the MEM Rotary Fused Isolator are finished in grey stove enamel.

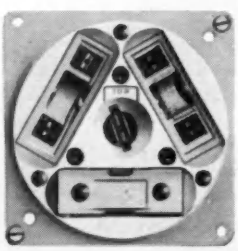
Handsome appearance and high efficiency go hand in hand here, in the MEM Rotary Fused Isolator.

Designed for use with A.C. Motors on machine tools and other similar applications, this switch is of a slow break A.C. pattern rated at 15 amps., 500 volts. It will safely disconnect a stalled motor of 7½ h.p. taking six to eight times full load current.

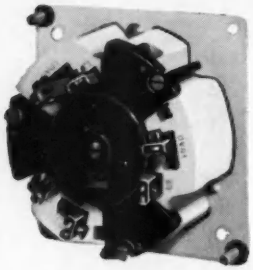
The unit takes 15 amp., rewirable "Kantark Major" fuses or alternatively you can choose standard H.R.C. fuse links to the dimensions of B.S.88 1952, Appendix J.

Fuses can be inspected or renewed in perfect safety. The cover can only be removed when the switch is in the 'off' position, and then the fuse contacts are completely isolated from the incoming supply.

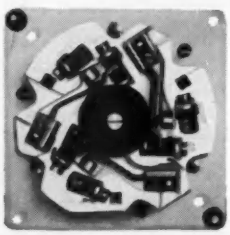
Two patterns are available, for flush or surface mounting.



Fuse inspection is absolutely safe. The fuse sockets are isolated by the removal of the cover and it is impossible to touch live metal.



Wiring is especially easy. Heavy clamp terminals are provided and are clearly identified. An indicator shows whether the switch is on or off.

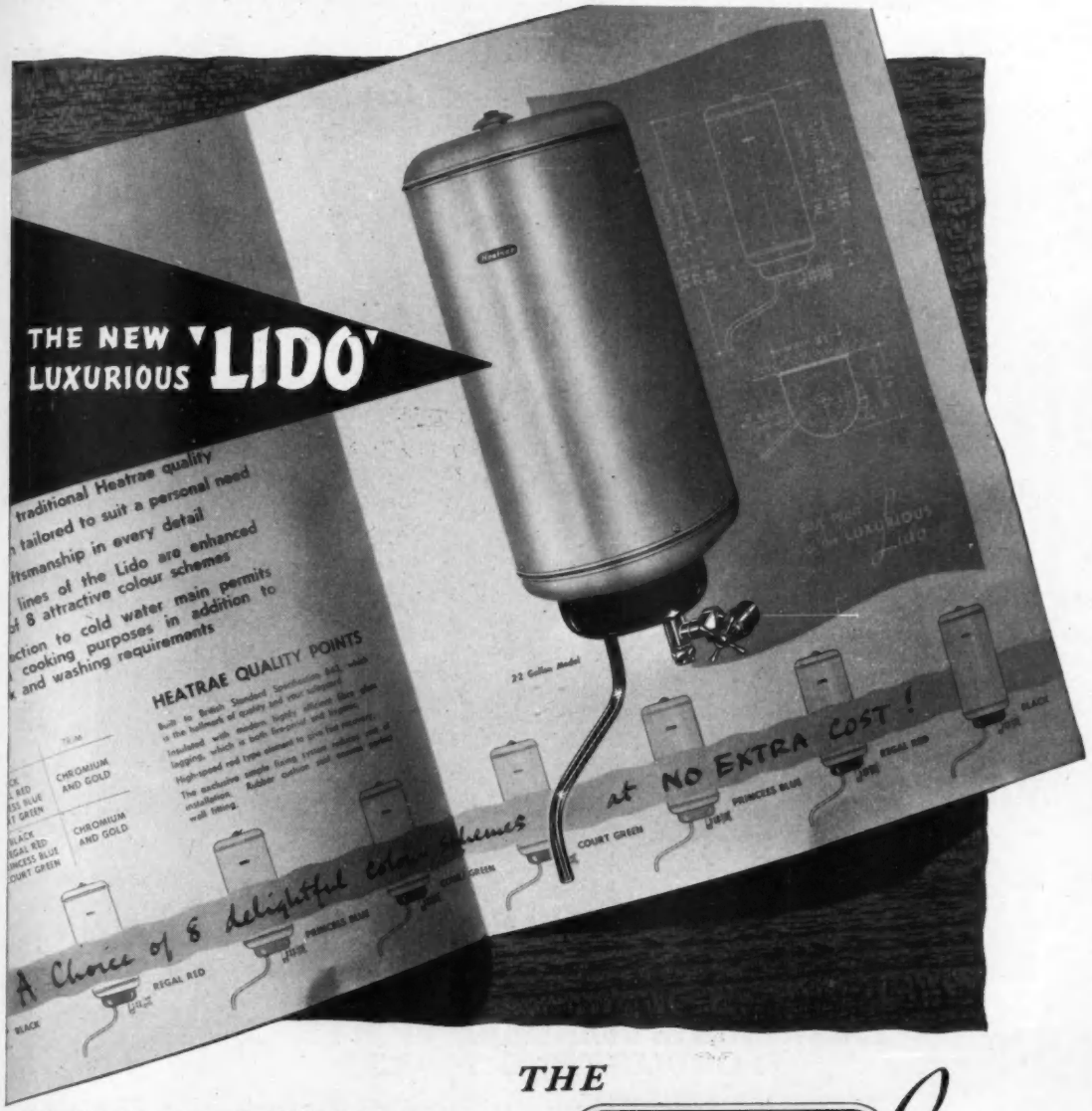


The three phases of the robust cam operated switch are separated by thick porcelain walls. Contacts are solid silver. Inspection is simple once the plastic switch cover is removed.

MEM

Send for illustrated leaflet No. 365(X)

MIDLAND ELECTRIC MANUFACTURING COMPANY LIMITED · TYSELEY · BIRMINGHAM 11


THE NEW LUXURIOUS 'LIDO'
traditional Heatrae quality
tailored to suit a personal need
ttsmanship in every detail
lines of the Lido are enhanced
of 8 attractive colour schemes
ection to cold water main permits
cooking purposes in addition to
and washing requirements
HEATRAE QUALITY POINTS
CHROMIUM AND GOLD
CHROMIUM AND GOLD
22 Gallon Model
A Choice of 8 delightful colour schemes at NO EXTRA COST!
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PRINCESS BLUE
COURT GREEN
BLACK

Embodying *all* the features found desirable in many years of experience.

- ★ Strong pressure tested cylindrical tinned copper water chamber.
- ★ Zinc coated steel outer casing, flat back, 'D' shaped (as originated by Heatrae) to fit snugly on wall with rubber seal. Beautifully finished in a range of colours.
- ★ Narrow space-saving width, the same in all three sizes; extra capacity being given by increased height.
- ★ The supporting bracket serves as a fixing jig.
- ★ A useful range of loadings up to 2,000 watts to give quick recovery.
- ★ High speed Rod Type Element.
- ★ Full approval of Area Boards and British Waterworks Association.
- ★ Built to British Standard Specification 843 — the Hall Mark of quality.

THE **Heatrae** *Lido*

THE PERFECT ELECTRIC WATER HEATER FOR SINK AND WASH BASIN

Made in three useful sizes 1½-2·2-3 gallons capacity

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★ Full details and prices are given in Leaflet No. 85 which will be sent on request.

Manufacturers of: Electric Water Heaters, Immersion Heaters, Oil Heaters, Urns, Towel Rails, Airing Cupboard Heaters, Flameproof Heating Apparatus, Electric Fires, Food Trolleys, Warming Plates, Air Heaters.

HEATRAE LIMITED • NORWICH • *Established in 1920* • *Pioneers in All-British Electric Water Heaters*

A

TUBEWRIGHTS STANDARD HIGH-LEVEL FLOODLIGHTING TOWERS

The illustration shows Tubewrights standard tubular steel towers, 100-ft. high, installed at the N.C.B. Blidworth Colliery, Mansfield, Notts. These are fitted with the 'type C' rectangular platform.

Tubular steel construction gives a clean appearance; moreover, wind loading is reduced and lighter members can be used with a saving in weight, cost of erection and maintenance.

TUBEWRIGHTS LTD.

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You cannot buy better gear

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- ★ A NEW RANGE OF FUSEBOARDS OF SUPERIOR DESIGN AND MODERN STYLING
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- ★ EASY INSTALLATION AND WIRING

SEE THIS NEW RANGE AT
THE ELECTRICAL ENGINEERS
A.S.E.E. EXHIBITION
EARLS COURT 25th–29th MARCH
ON STAND No. M.8

BILL SWITCHGEAR LTD.
ASTON LANE · PERRY BARR
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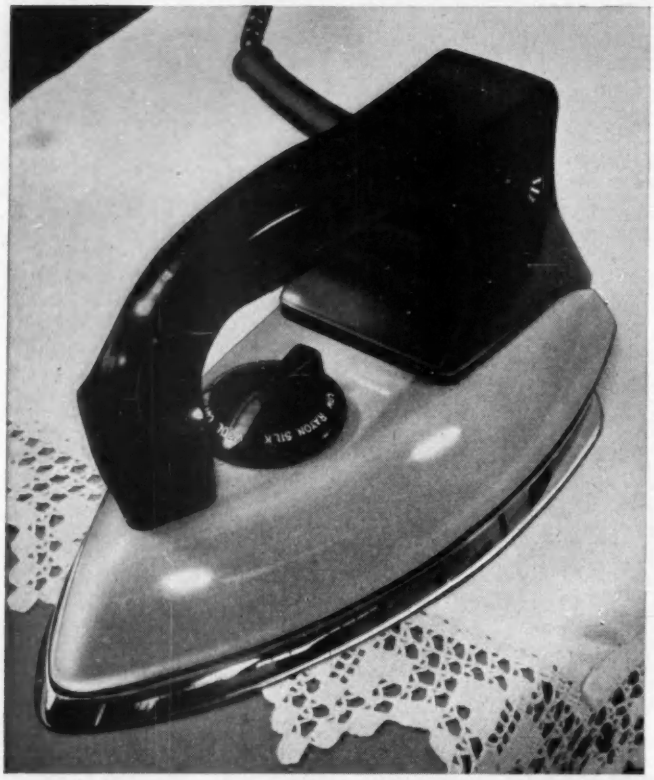
BELFAST J. BALLENTINE. BEDFORD ST.

ANY OLD IRON

won't do for her . . .

she wants a Revo Automatic Electric Iron



Here's the answer to housewives who think their old iron "good enough". Captivating "House & Garden Colours" arrest the eye at once. Closer examination reveals a superb easy-grip jet black moulded handle (with left or right thumb-rest) . . . a large finger-tip control knob with graduated settings for appropriate fabrics . . . and a streamlined chromium sole plate for effortless ironing.

* * *

★ *Available in Chromium plate or colours in Porcelain or Art enamel—Citron Yellow, Dresden Blue, Willow Green, Guardsman Red.*

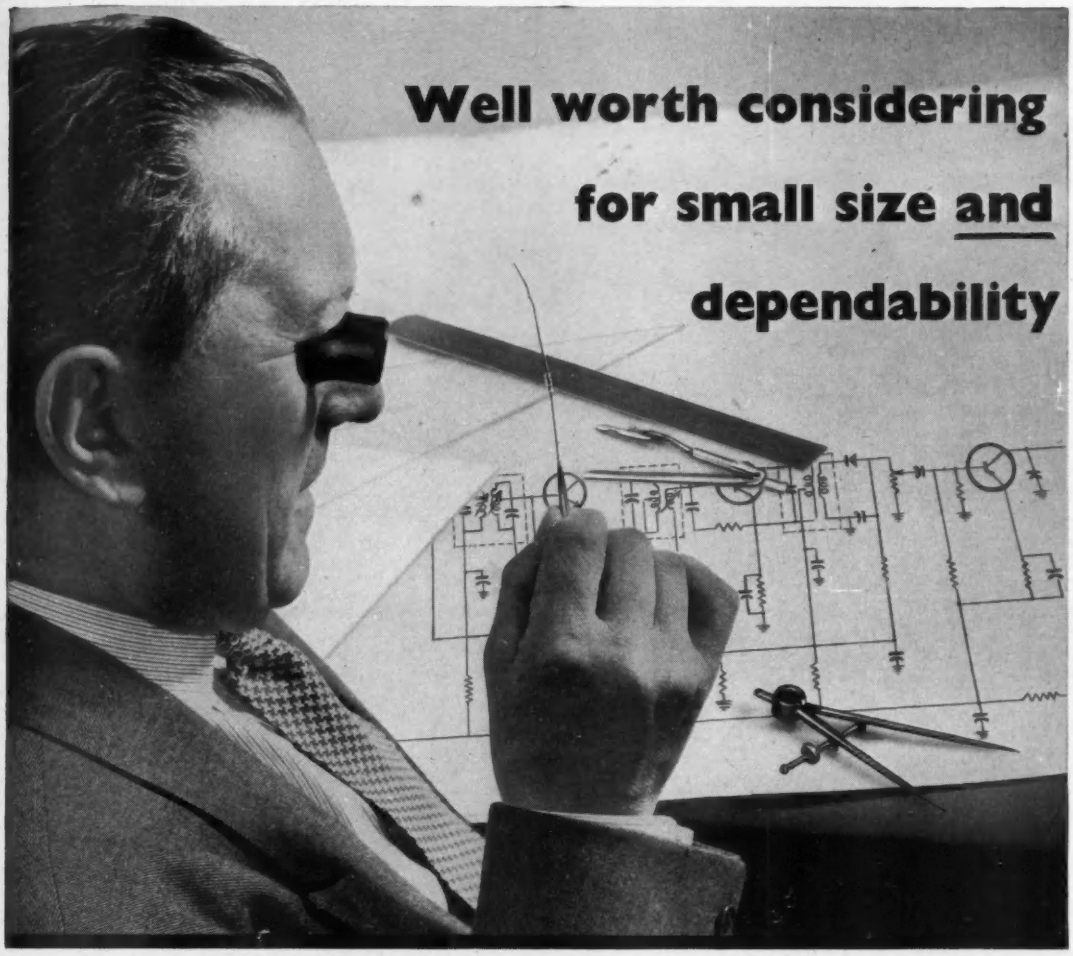
★ *Remarkably quick-heating — stays hot longer, too!*

Weight 4½ lbs. For A.C. Mains only. Loading 650 watts. Complete with non-kink flexible cable. Prices: Chromium Plated 45/- plus 9/11 P.T. Colours in Porcelain Enamel 47/6 plus 10/5 P.T. Colours in Art Enamel 39/6 plus 8/7 P.T.

Choose right - choose **REVO** REGD. *Automatic Electric Iron*

Write for details of any of the above appliances to:

REVO ELECTRIC CO. LTD., TIPTON, STAFFS. *'PHONE: TIPTON 2828 GRAMS: REVO TIPTON*



The new type BTH Germanium Point Contact Rectifiers—

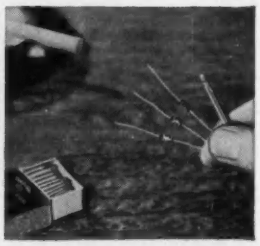
Only ¼ in. long, yet their miniature size is combined with high performance and complete dependability! They offer the following outstanding characteristics:

- HIGH TEMPERATURE STABILITY
- ABILITY TO WITHSTAND TROPICAL CONDITIONS
- SMALLER DIMENSIONS
- VERY LONG LIFE

RATINGS: CONTINUOUS OPERATION AT 25°C. (77°F.)

TYPE	PEAK INVERSE VOLTAGE† V	MAX. INPUT CURRENT mA	MAX. RESISTANCE at + 1 volt ohms	MIN. RESISTANCE at — 50 volts kilohms
CV 448*	80	30	333	500
CG41–H	65	30	250	50
CG42–H	100	30	500	1,000
CG44–H	80	30	333	500
CG50–H	100	30	500	200

*Type CV 448 has been granted 'type approval'. †Corresponds to 1·2 mA inverse current.



B T-H

BRITISH THOMSON-HOUSTON

THE BRITISH THOMSON-HOUSTON CO·LTD·LINCOLN·ENGLAND

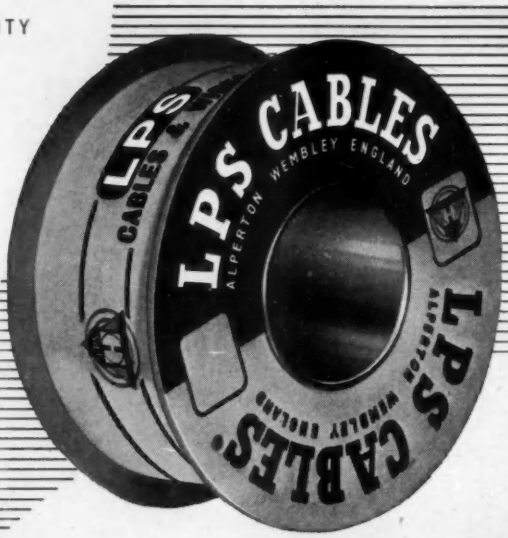
an A.E.I. Company

A.S.E.E. EXHIBITION — VISIT OUR STAND No. J12 A5162

THE SYMBOL OF QUALITY

LPS

INSULATED
WIRES & CABLES



Quality Cables

Manufactured and tested in strict accordance with—

B.S.S. 1557 — Polythene Insulated and P.V.C. sheathed cables
B.S.S. 2004 — P.V.C. insulated and sheathed cables
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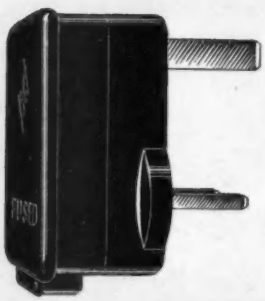
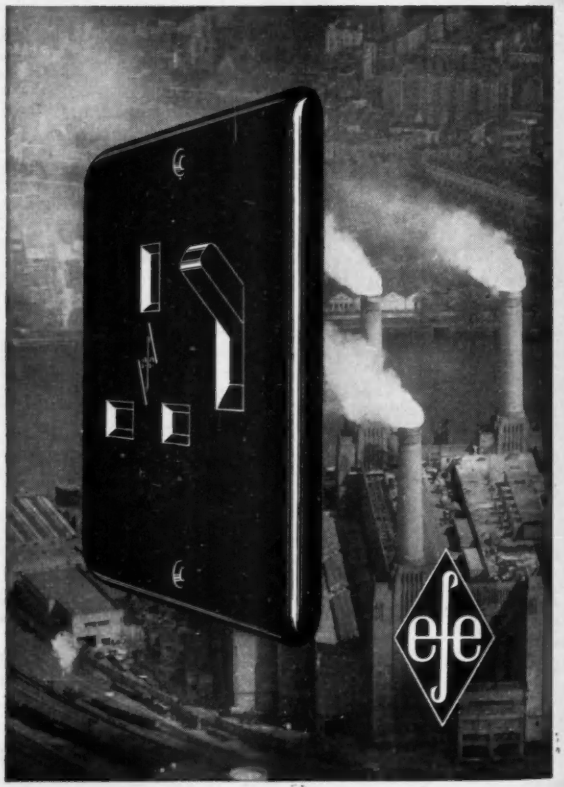
L.P.S. ELECTRICAL CO. LTD.

122 DRURY LANE, LONDON, W.C.2

Telephone: COVent Garden 3231 (8 lines) **'Grams: Engineyor, Phone, London** **Works: St. Leonards-on-Sea—Hastings 7061**

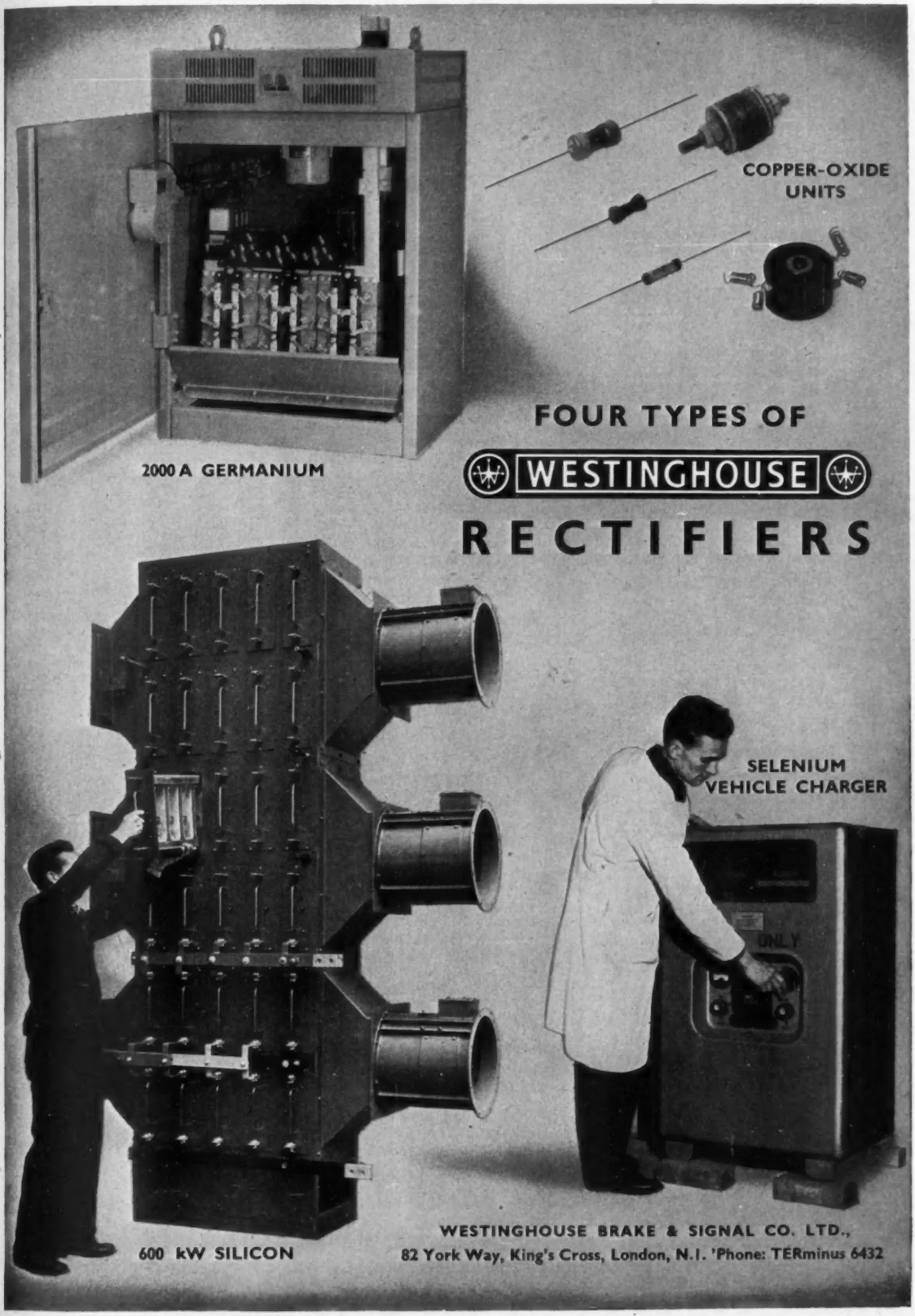
Plug into power . . .
with E.F.E. accessories



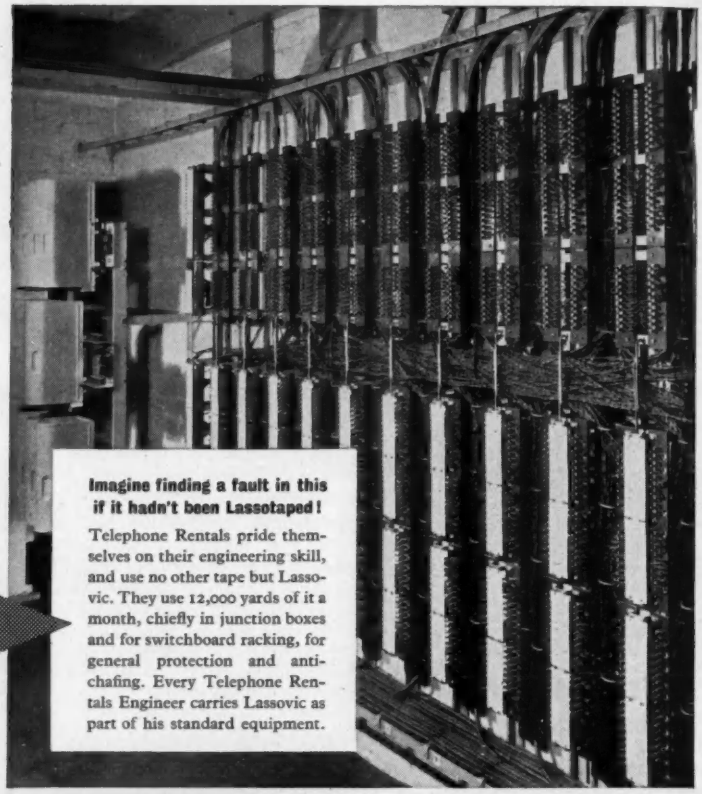


Every E.F.E. product is a powerful ally in your sales drive. Write for details and price lists of the complete range including the new 'RUBY RANGE' now the choice of leading Architects and Designers.

E. F. Electric Limited, Willow Lane, Watford, Herts.
Telephone: WATFORD 6878 • GADEBROOK 2616
Telegrams and Cables: EFE WATFORD


COPPER-OXIDE UNITS
2000 A GERMANIUM
FOUR TYPES OF
WESTINGHOUSE
RECTIFIERS
SELENIUM VEHICLE CHARGER
600 kW SILICON
WESTINGHOUSE BRAKE & SIGNAL CO. LTD.,
82 York Way, King's Cross, London, N.1. 'Phone: TERminus 6432

This is why TELEPHONE RENTALS



Imagine finding a fault in this if it hadn't been Lassotaped!

Telephone Rentals pride themselves on their engineering skill, and use no other tape but Lassovic. They use 12,000 yards of it a month, chiefly in junction boxes and for switchboard racking, for general protection and anti-chafing. Every Telephone Rentals Engineer carries Lassovic as part of his standard equipment.

and MURPHY RADIO

Corrosion is the danger: Lassothene is the answer

Any material that Murphy uses has to pass rigorous type approval tests in their Engineering Dept. They gave Lassothene good marks for high dielectric strength, low water absorption, and chemical purity. Here are components for a portable radio, and TV sets.

always rely on LASSOTAPES

Advice and information free at any time from
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FIRE ALARMS IN FACTORIES

3 DAYS' FREE TRIAL OFFER

THE FACTORY ACT 1937 SAYS—
In case of "fire," alarms must be sounded which will be clearly audible to every operative throughout the building.

★ **To all Factory owners, electrical contractors and others who have the responsibility to decide what type of alarm and how many we make the above offer of our "M" type siren.**

★ **This has been designed to "cut through" all noise levels in factories. These sirens can be supplied to work on any voltage AC or DC.**

★ **Easily portable (weight 4lbs.) and can be carried round to every department and plugged into any convenient lighting point so as to determine the number required for the whole factory.**

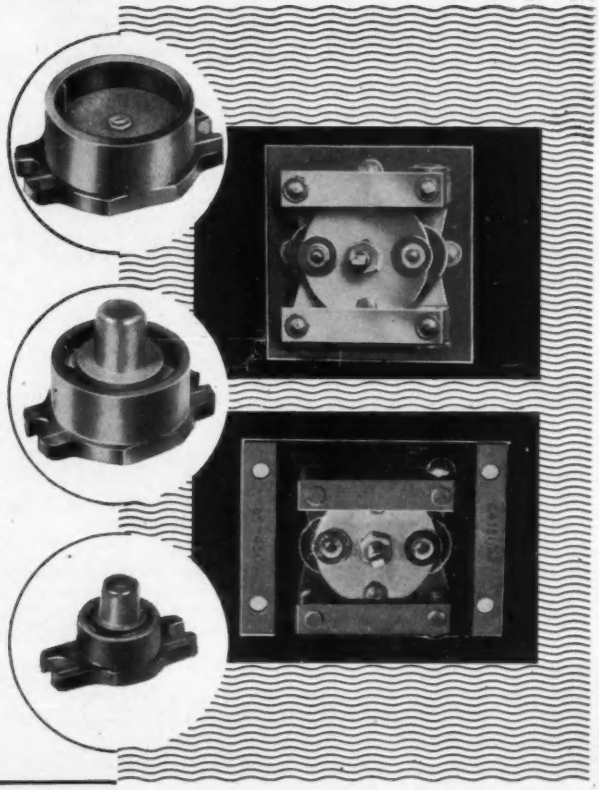
WAILERS: To produce the wailing note on the siren, a wailer can be supplied which can operate any number of sirens.
INDICATORS: Where it is desired to notify a central point where an alarm point has been operated we have electrically illuminated indicators. This, in addition to showing the position, will give an audible signal in any desired point, fire dept., engineers' office, etc. Fire calls can also be arranged to be transmitted direct to nearest Fire Station.
Our sirens, alarm pushes, and all our equipment are in accordance with the "British standards code of practice" and has the approval of Factory Inspectors.
INSTALLATION: We have representatives in all parts of the country who will call and advise you, and submit complete estimates. We will also on request send you full detailed diagrams to enable your own staff or local contractor to carry out the work.

Send today for list No. 59 and our offer of 3 days' Free Trial

CARTER & CO. (NELSON) LIMITED
WILLIAM STREET · NELSON · LANCASHIRE
Telephone: NELSON 638

THERMOSTATS

for MOTOR PROTECTION
OVERHEAT PROTECTION
TEMPERATURE CONTROL



KLIXON

Snap-action bi-metallic disc reduces risk of motor burn-outs, and provides complete protection.
For details of these, and thermostats for temperature control, write to:—

SALFORD ELECTRICAL INSTRUMENTS LTD.
PEEL WORKS · SILK STREET · SALFORD 3
A Subsidiary of THE GENERAL ELECTRIC CO. LTD. OF ENGLAND

Verb. sap.

From Rome we have been asked to supply a replacement resistance for a capstan on board ship — the original was supplied in 1924! —— 33 years' service.

No wonder we came to the conclusion that our 5 years' guarantee was unnecessary!

Immediate delivery . . .

In addition to supplying cables of
every description to all parts
of the world we have in fact supplied
cables to the U.S.A. and to the U.K.
in connection with Intercontinental
and Intermediate Range Ballistic Missiles

WANDLESIDE CABLES *for every purpose*

WANDLESIDE CABLE WORKS LTD. 106 GARRATT LANE WANDSWORTH LONDON SW18

One of FALKS Group

Telephone: BATtersea 2273 (5 lines) Telegrams: Wandleside, London

We're aiming this BIG BELLING ADVERTISEMENT AT 26,000,000 READERS!

Throughout February this impressive, large-space advertisement for the famous Belling 47AB Electric Cooker will appear in all the biggest national papers with a combined circulation of over 26,000,000 and a vastly greater readership. Here are some of the circulation figures:

RADIO TIMES 8,469,050
DAILY EXPRESS 4,127,085
DAILY HERALD 1,640,707
DAILY MAIL 2,138,570
DAILY MIRROR 4,658,793
DAILY SKETCH 1,304,892
DAILY TELEGRAPH 1,123,556
NEWS CHRONICLE 1,394,077
TV TIMES 1,900,000

This announcement gives you a wonderful opportunity to display the 47AB in time to reap the benefit of this great spring advertising offensive.

By the way, if you want any Belling catalogues or folders, please let us know.

LARGE HOB
(21" x 21")
takes five or six pans
LARGE HOTCUPBOARD
(18" x 18" x 6")
with door to keep in heat
FULL SIZE INNER GLASS DOOR
so that you can SEE what's cooking
THREE SHELF OVEN
(16" x 16" x 13")
removable one piece for easy cleaning
"Belling" 47AB
£36.6.0
Or with drawer (as shown) £37.13.0
Auto-timer model from £43.19.9
Britain's most successful electric cooker
Are you satisfied with your cooking? You will be if you have a new Belling 47AB. It's so cheap to run and so easy to use—and to keep clean, too. You'll be delighted with your cooking—pastry that melts in the mouth—cakes so light and airy—bread so fresh and crusty. Meat roasted just as it should be—crisp, brown, yet juicy. Perfect cooking will be yours with a Belling 47AB—Britain's most successful electric cooker. See one at your Electrical Shop or Showroom.
"Belling"
FREE 56-PAGE BOOK
describing this and all the other Belling electric cookers and fires. Write for free copy to Belling & Co. Ltd. Enfield, Middlesex. No obligation. No follow-up calls.
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"Belling"

BELLING & CO. LTD., ENFIELD, MIDDLESEX. HOWARD 1212.

CRC451

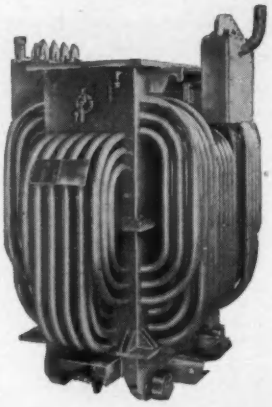
THE NELSON ENGINEERING CO. LTD.

specialized products for industry

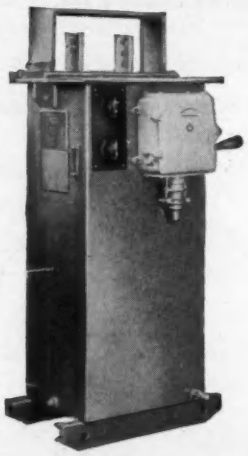
In addition to standard products, the Nelson Engineering Co. Ltd. manufacture specialized products for a wide range of manufacturing industries.
These products include special transformers, motors, control equipment, etc.

for

Power Stations, Paper Mills, The Textile Industry, Chemical Plants, Steel Works, Cycle Manufacturers, Machine Tools, Oil Installations, etc.
Other users include:— Food Manufacture and Processing, Gas Undertakings, Electricity Boards and the Mining Industry



Power Transformers up to 1,000 kVA



Special types for Industrial Applications

Equipment supplied includes:—

- Ward Leonard Equipment
- Special Rectifier Sets
- Battery Charging Equipment
- Induction Heating Transformers
- Welding Transformers
- Motors for special applications
- Voltage Regulating Equipment

THE NELSON ENGINEERING CO. LTD.

NELSON • LANCASHIRE

Telephone: Nelson 1545-6 *Telegrams: Nelson 1545*

LONDON OFFICE: MESSRS. VERITYS LTD., BRETTENHAM HOUSE LANCASTER PLACE, STRAND, W.C.2

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THE FINEST RANGE OF SMALL HORSE POWER MOTORS FOR ANY INSTALLATION

with the one-piece gearbox...

★ strong, stiff, a box casting always properly in line

★ with no possible oil leaks through joints

★ gears transmit 200 lb. ft. at 26 r.p.m. up to 480 r.p.m.

★ or 100 lb. ft. between 0.66 r.p.m. and 22 r.p.m.

★ foot or flange mounting

TYPE H.D.
geared motors

A.C. or D.C. NECO motors of all fixed or variable speed types, made in the same factory as the gearbox, allow competitive prices and speedy delivery.

NECO TRADE MARK

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a non-ring firm
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SUBSIDIARY OF NORMAND ELECTRICAL CO. LTD
Telephone : MACaulay 3211-4

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FOR DISTRIBUTION AND INDUSTRY

Rectification for D.C. equipment · Testing units (1 or 3 ph.) with multiple tapping switch · Isolating transformers for electrical tools · Transformers for electronic equipment up to 30 kV · All industrial requirements up to 250 kVA.

Our transformers comply with all relevant B.S. specifications.

25 kVA rectifier unit for 12,000 v. D.C.

S.T.L. *Transformers are widely used in industry where reliable units are required for continuous duty.*

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for Electrical Insulation

VULCANISED FIBRE

LEATHEROID

EBONITE

BAKELITE (Fabric & Paper Base)

of every type

The largest and most comprehensive range of insulating materials in the country. Supplied in sheet, rod and tube form.

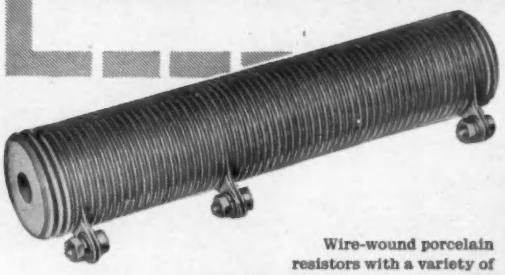
We can offer machined and pressed parts to your requirements in most types of Insulating Material. You will find our prices and service extremely competitive. Your enquiries will receive our prompt and careful attention.

Also Turned and Pressed Parts

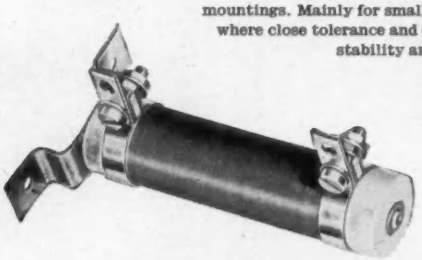
HEAVEN, DOWSETT & Co Ltd.

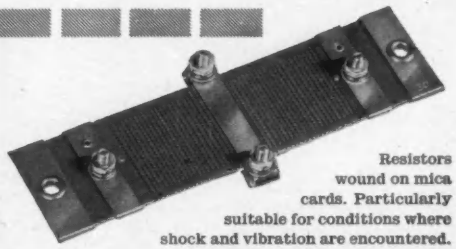
INSULATION HOUSE, 315 WELLINGTON ROAD BIRMINGHAM 20
Phone: BIRchfield 6218-9 *Grams:* Fibre B'ham 20

WIRE WOUND RESISTORS



Wire-wound porcelain resistors with a variety of mountings. Mainly for small loadings where close tolerance and electrical stability are needed.





Resistors wound on mica cards. Particularly suitable for conditions where shock and vibration are encountered. Easily mounted in groups for high wattage dissipation.

Made by

Cressall

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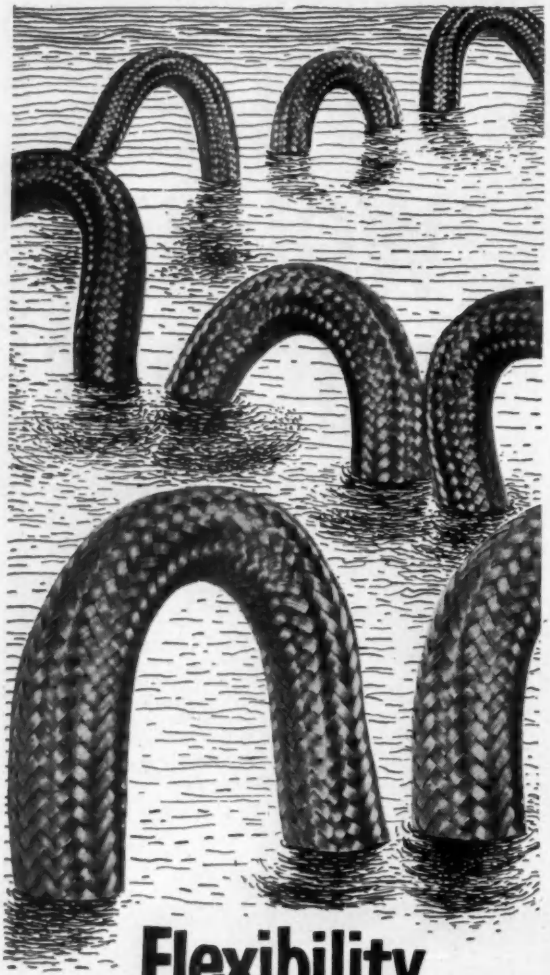

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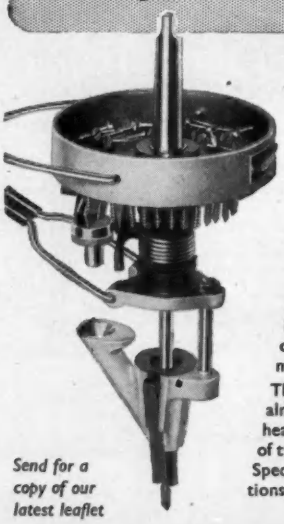

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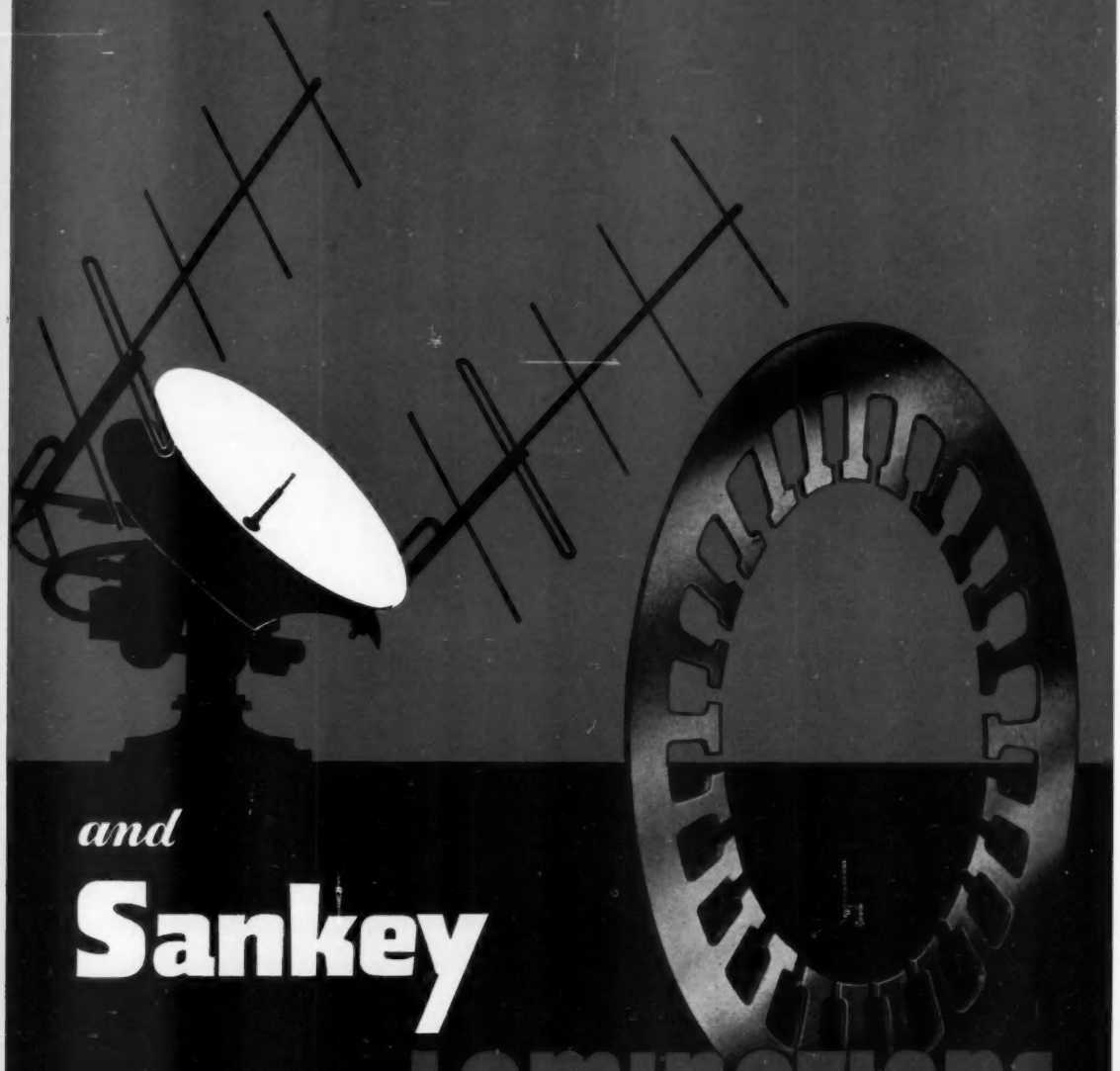

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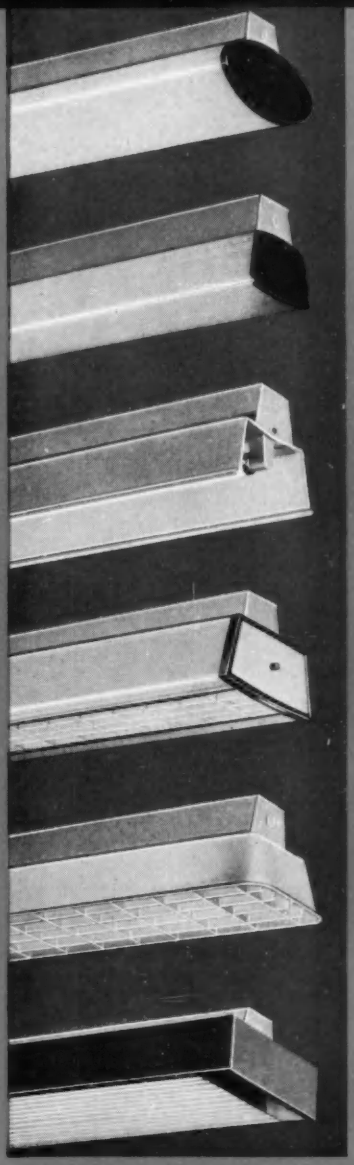

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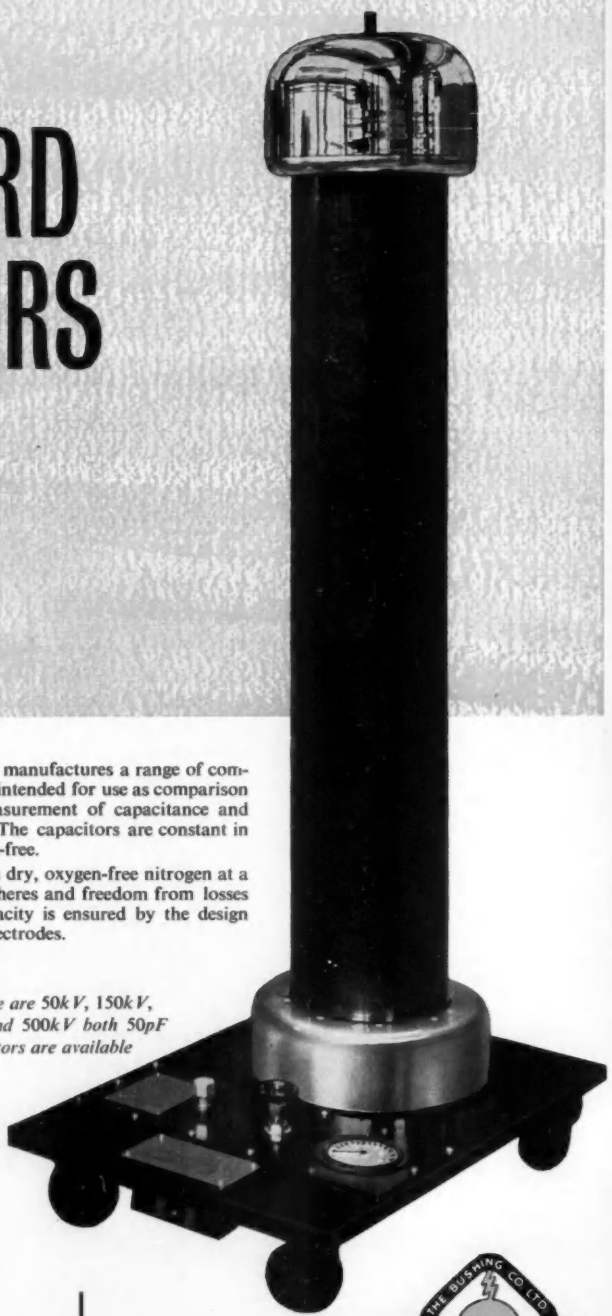

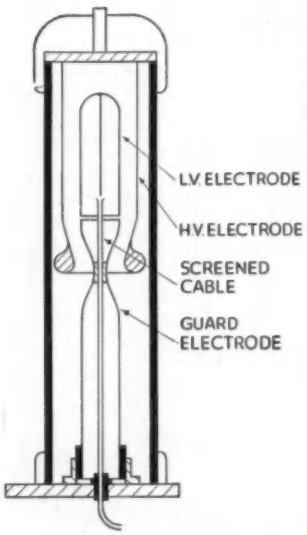

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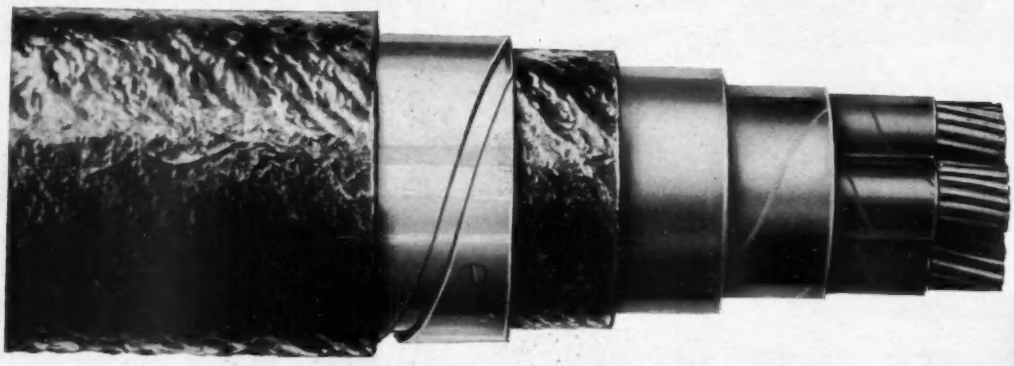

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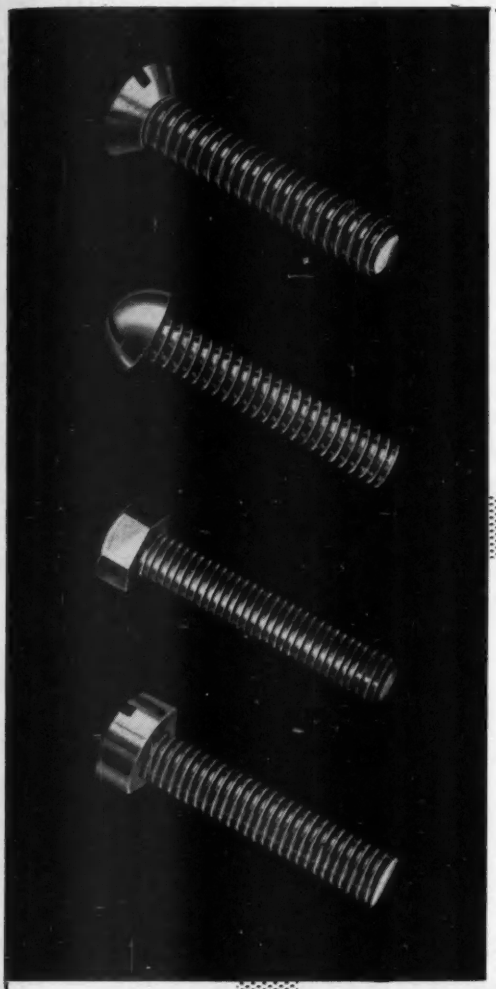

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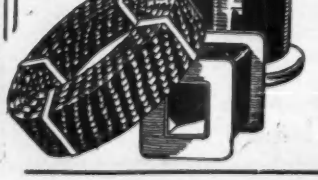

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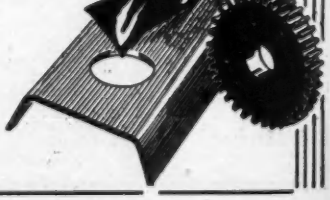

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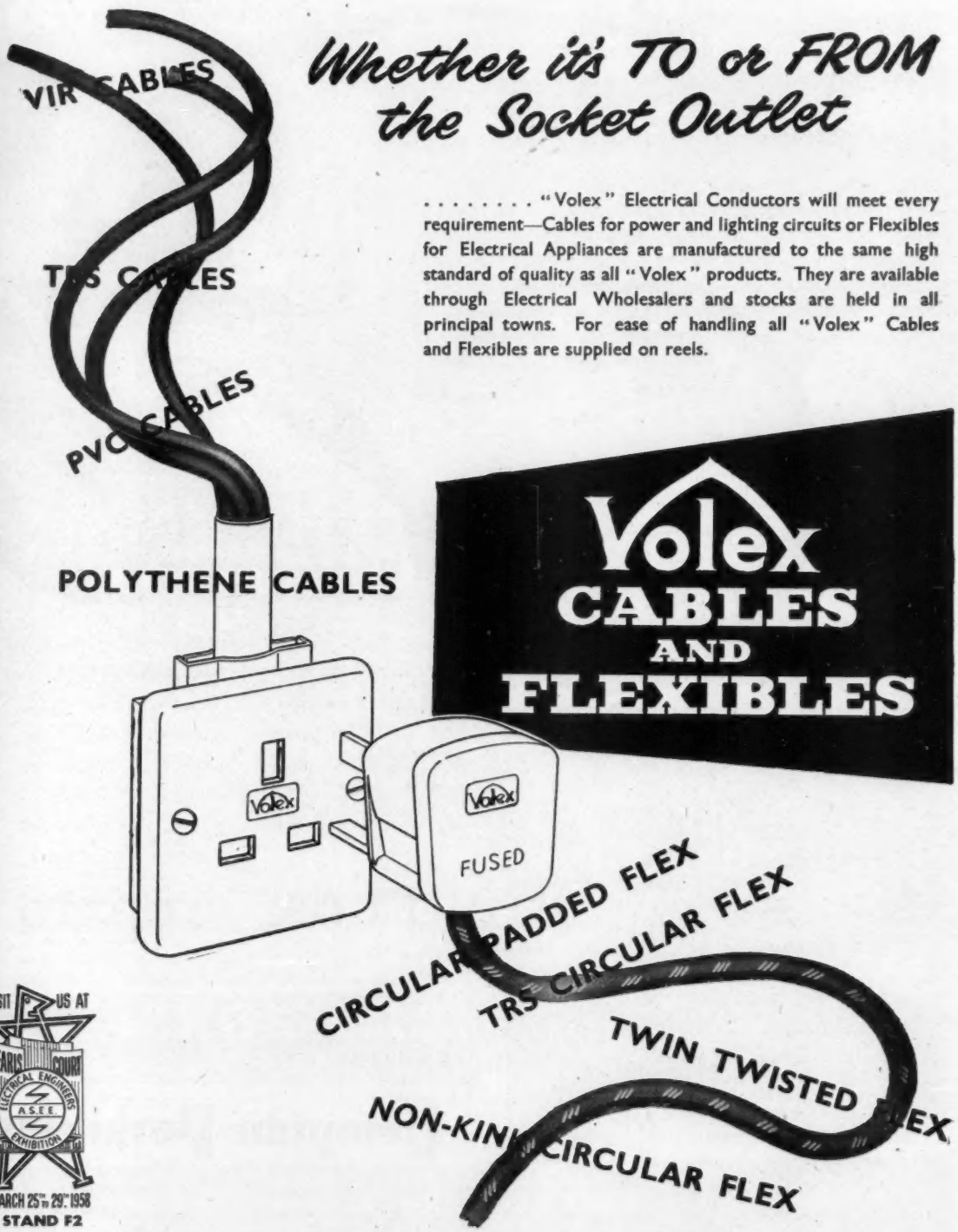

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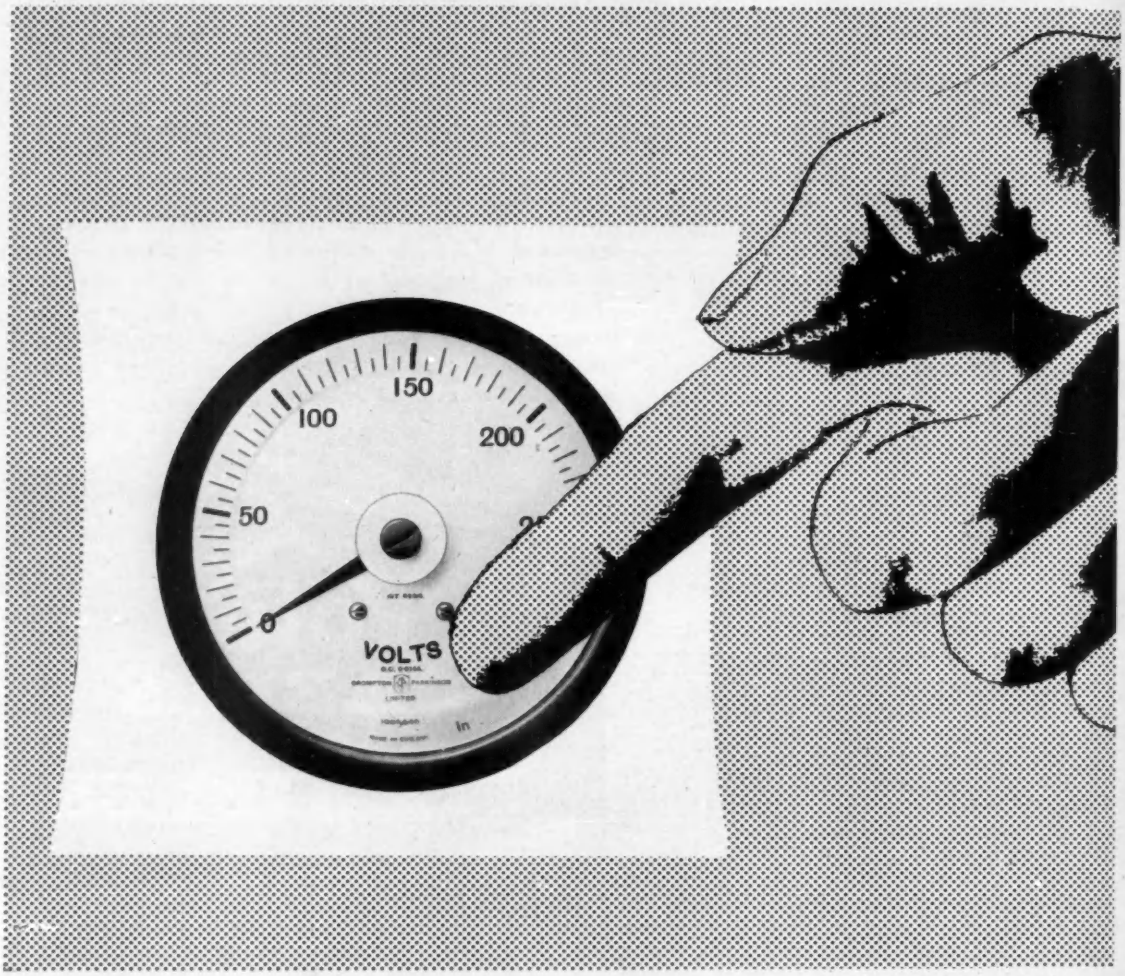

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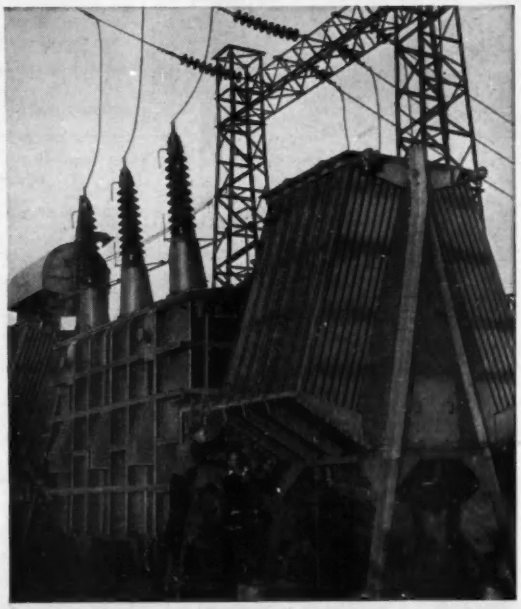

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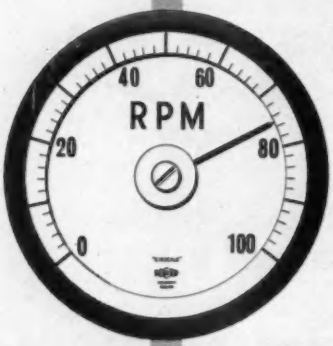

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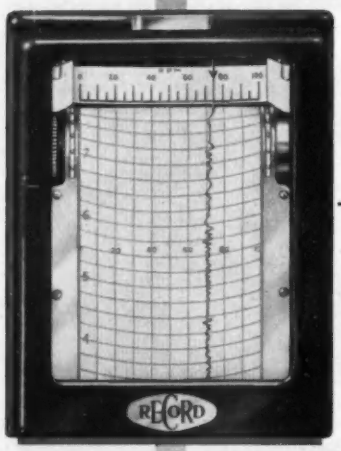

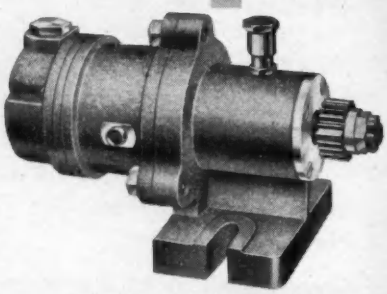

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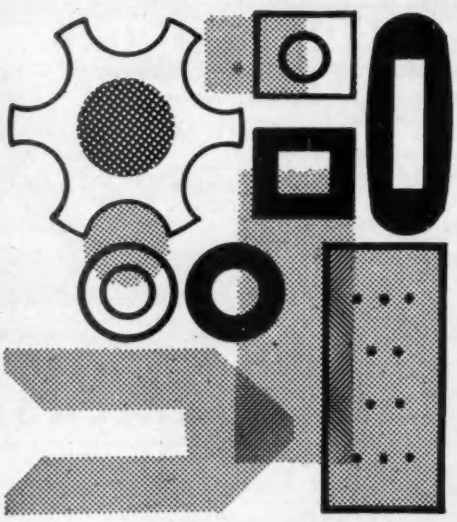

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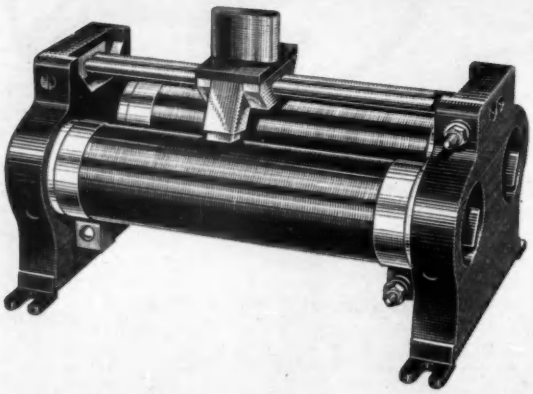

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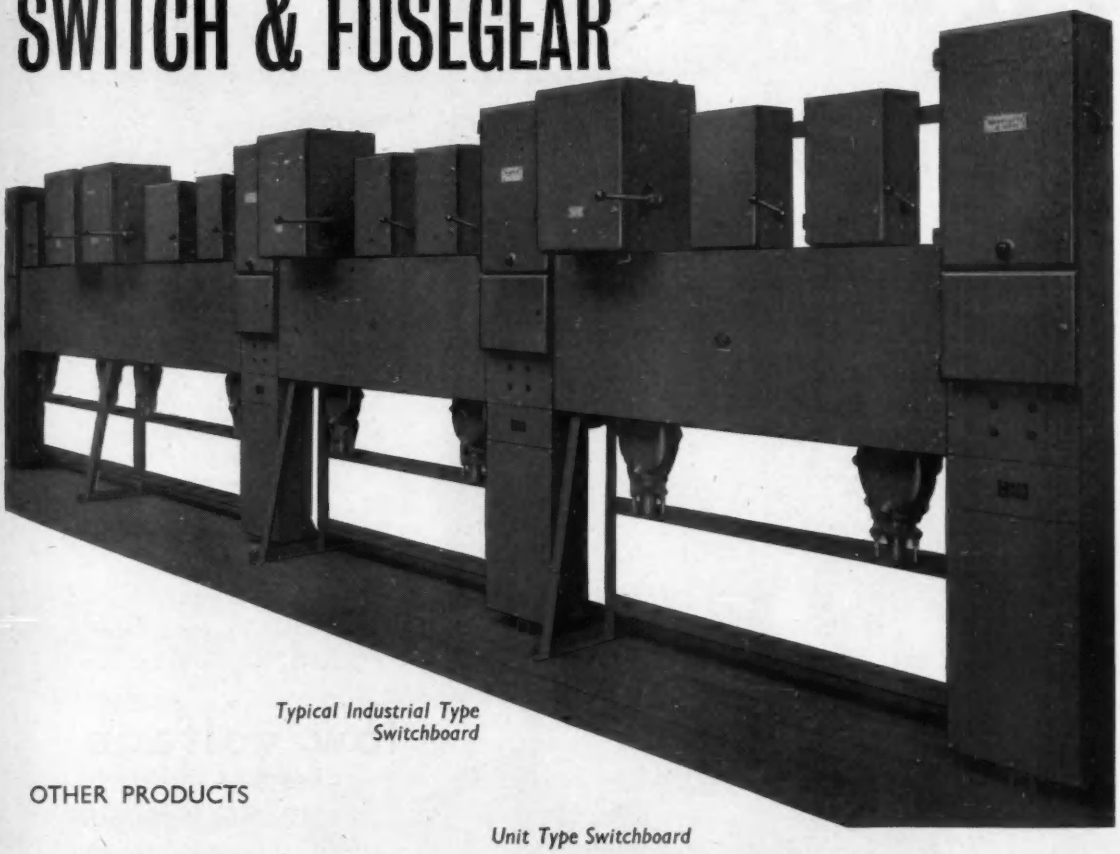

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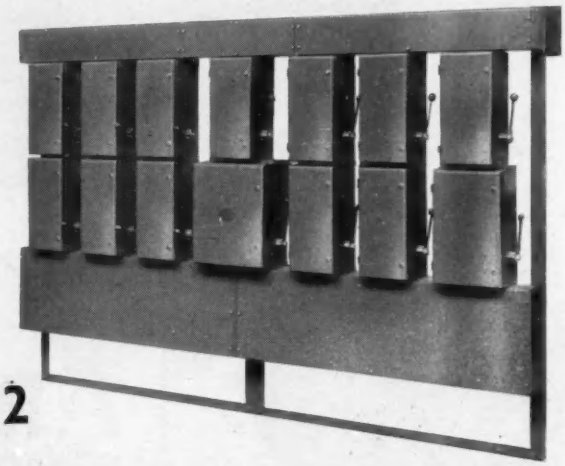

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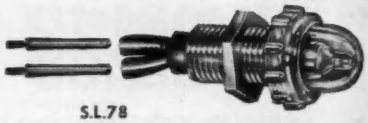
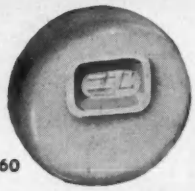

S.L.78

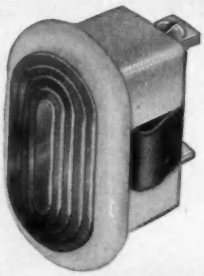
S.L.120

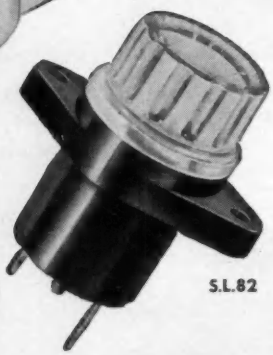
S.L.125


S.L.860

S.L.90/SB

S.L.86


S.L.50


S.L.82

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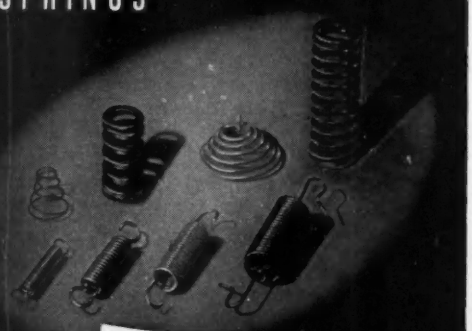

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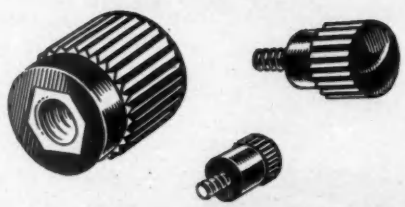

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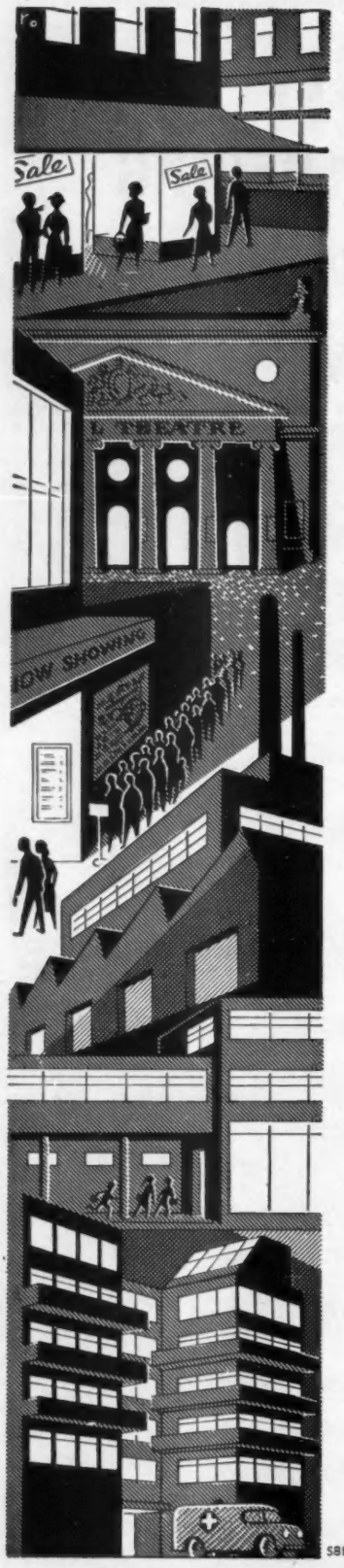

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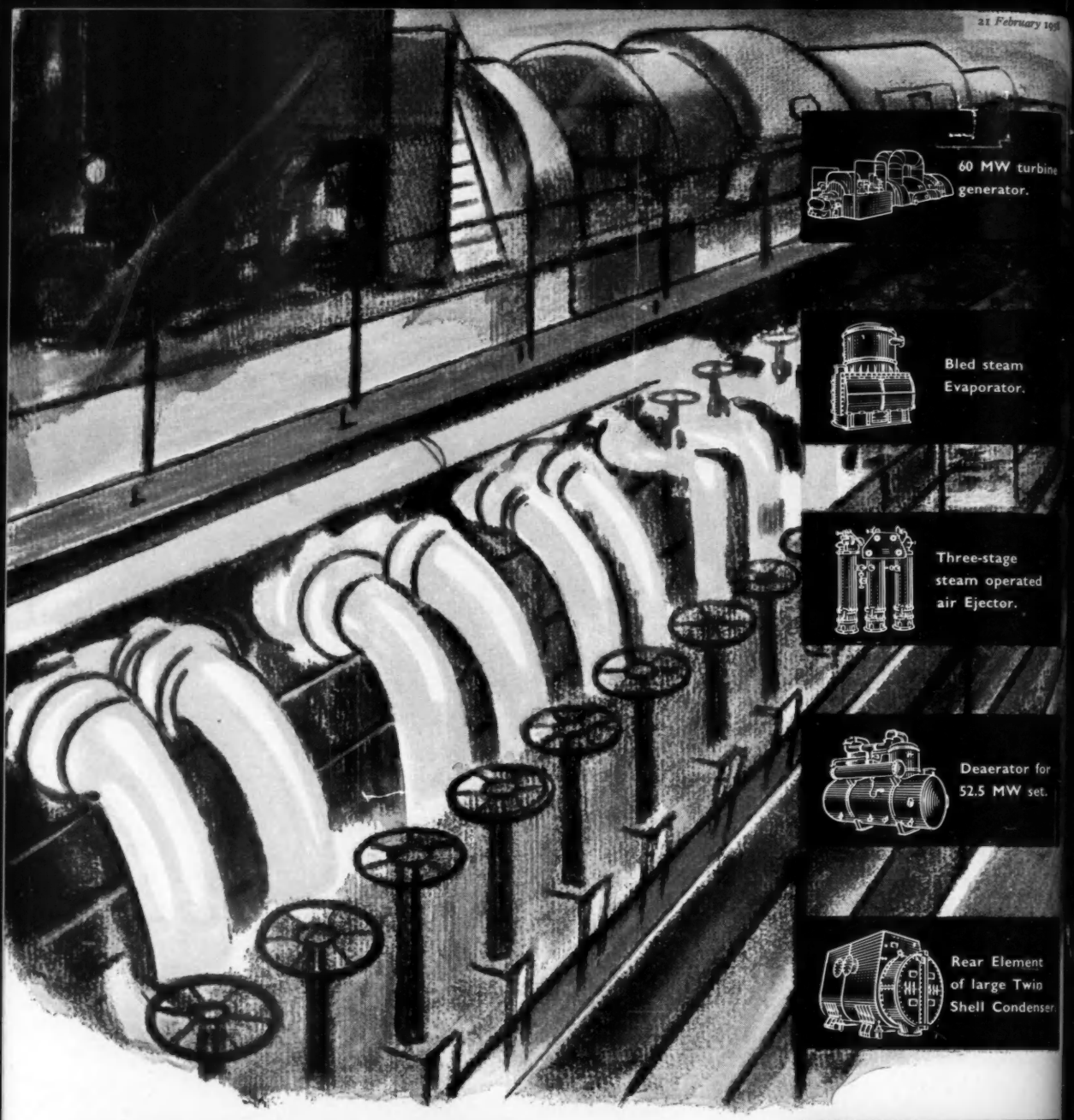

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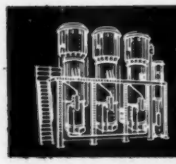

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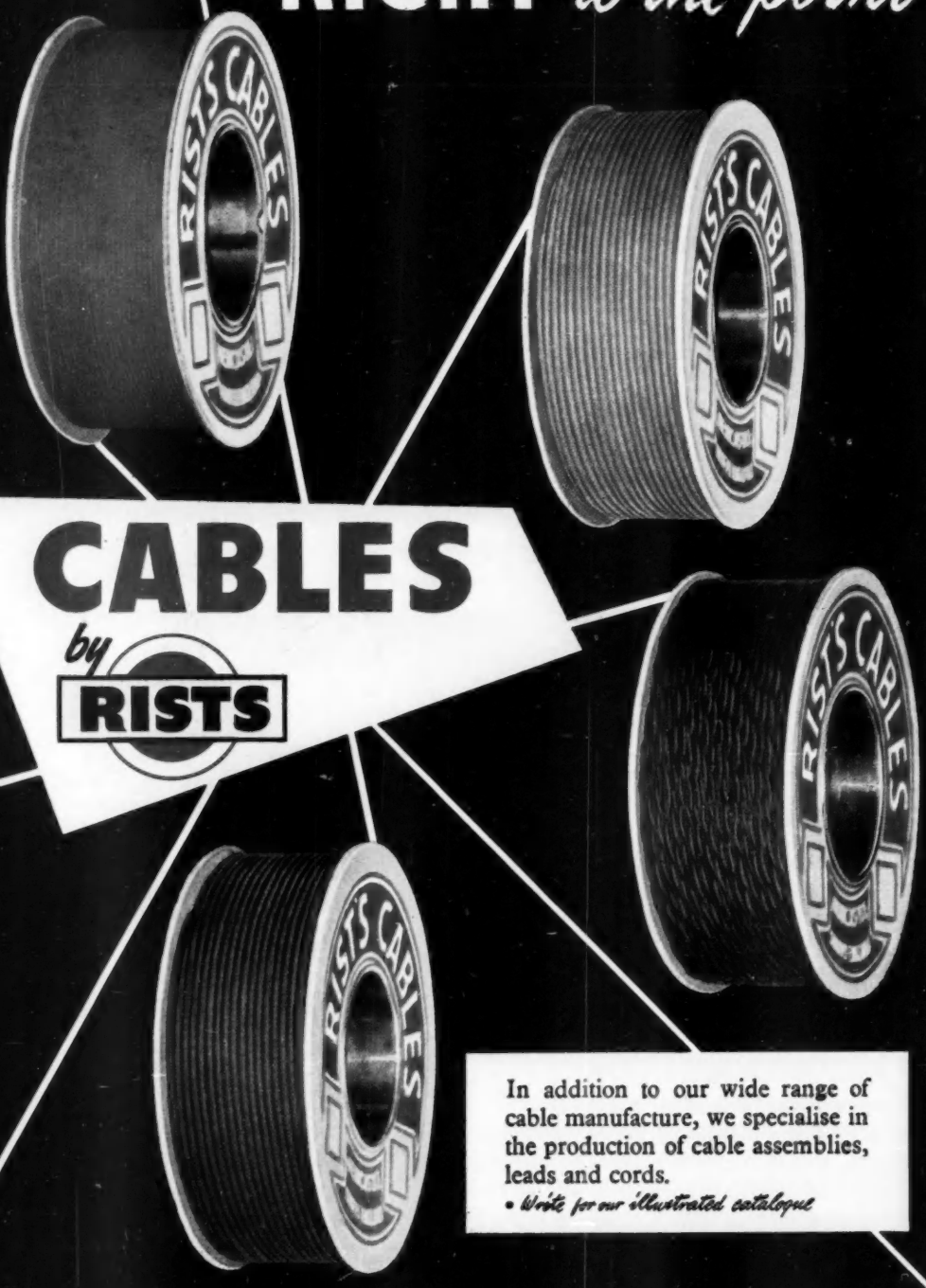

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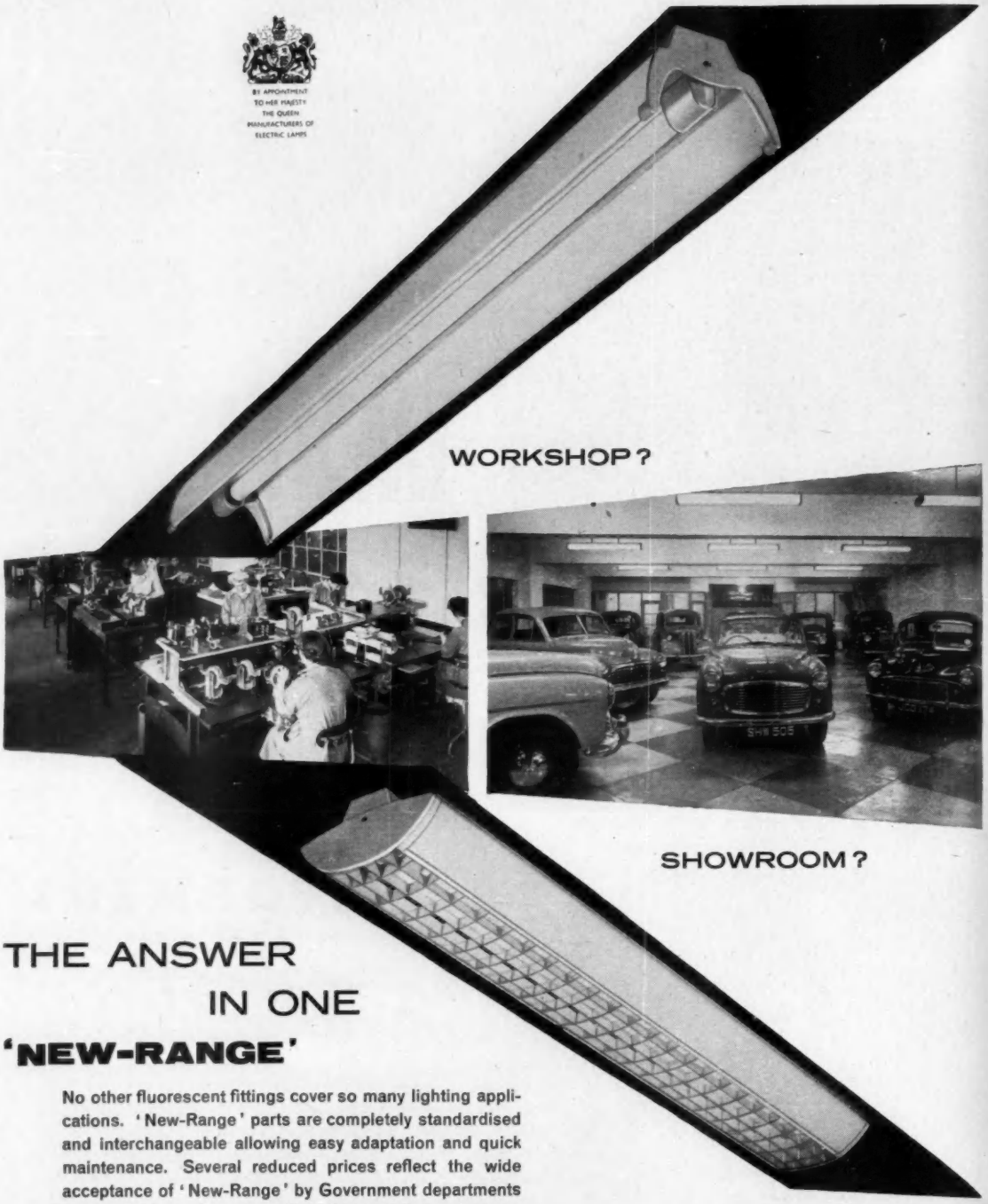

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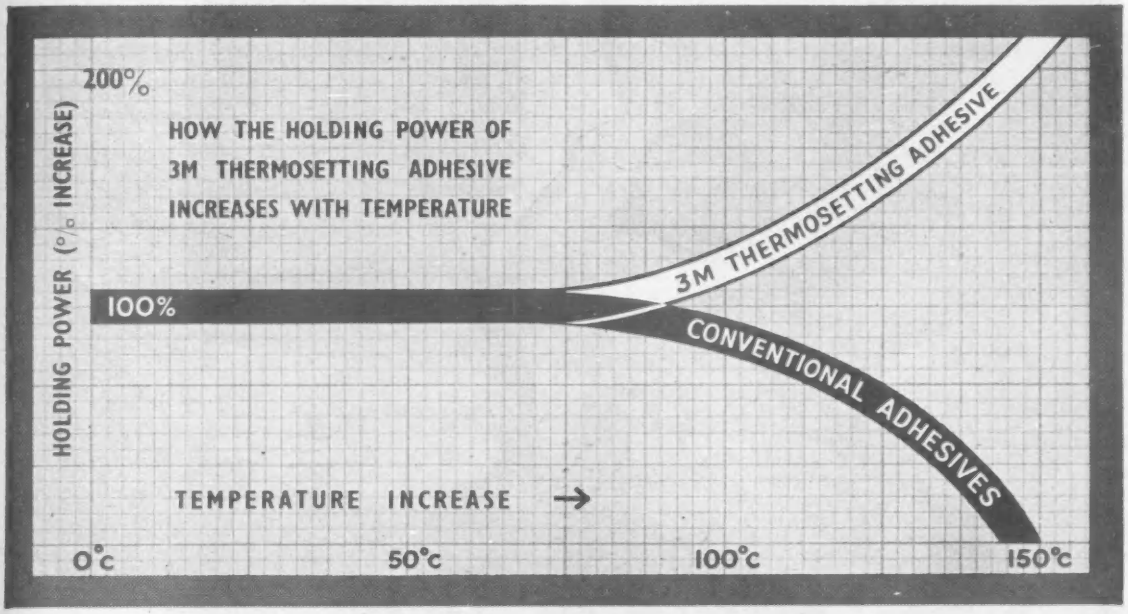

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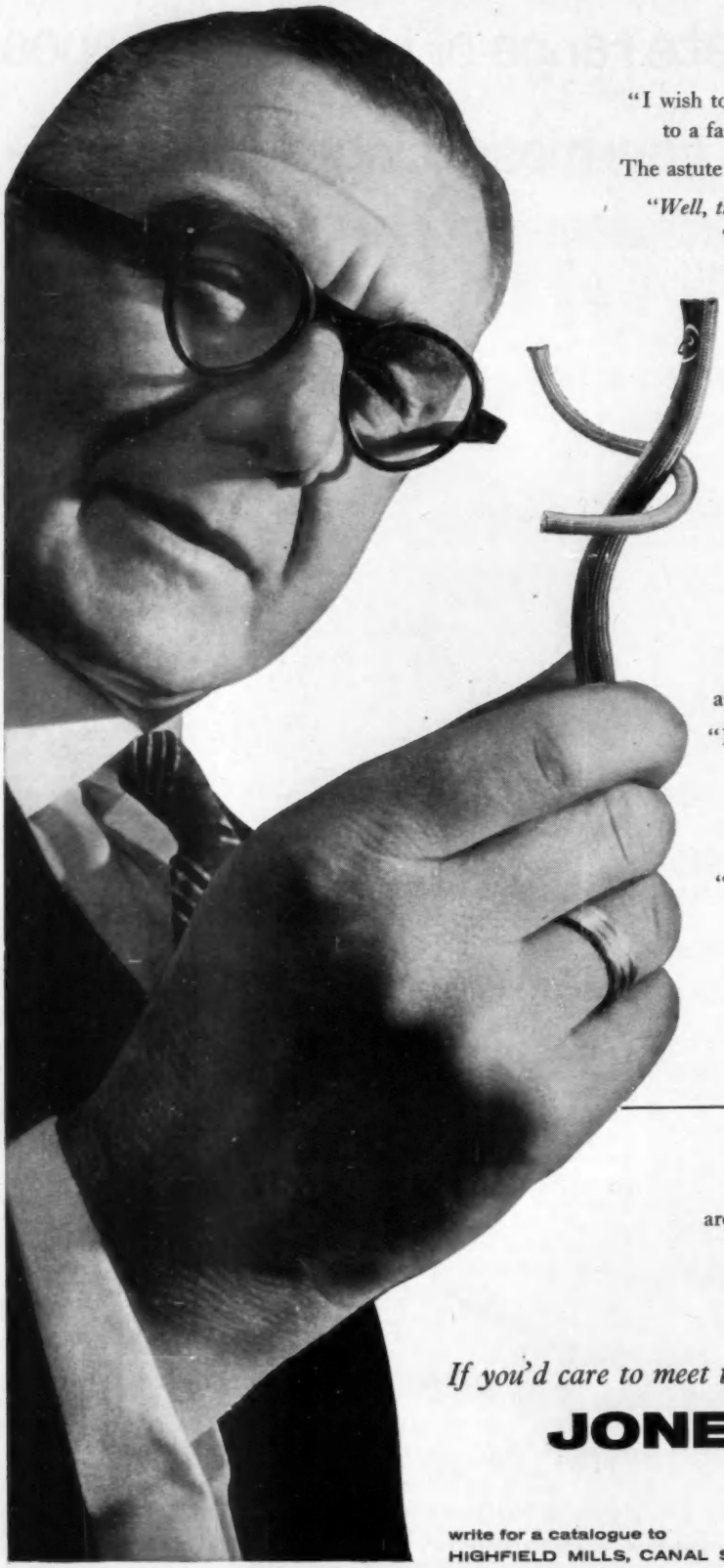

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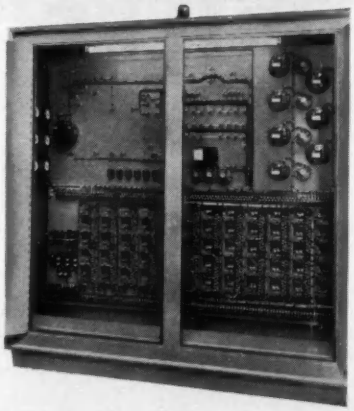

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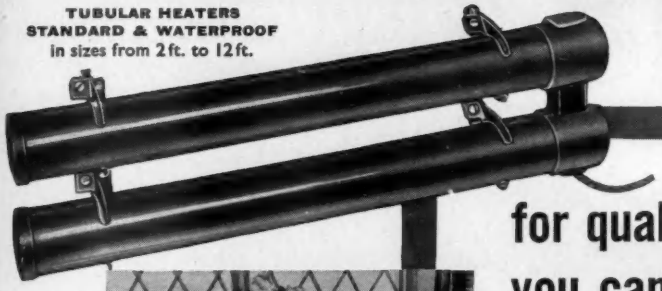

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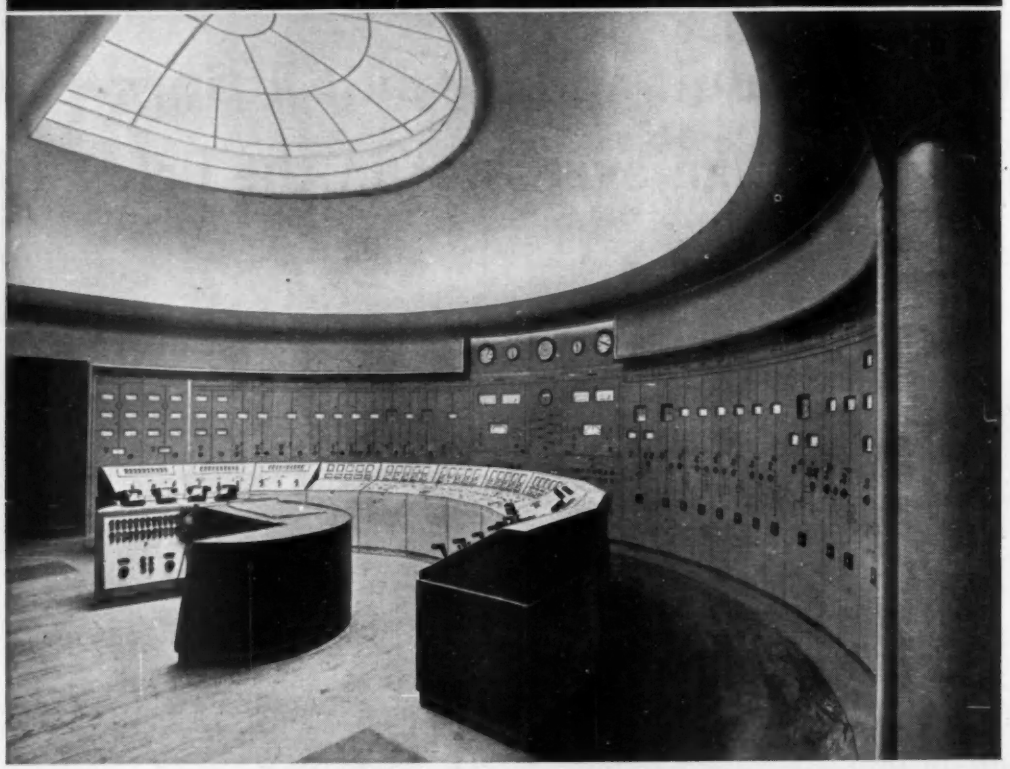

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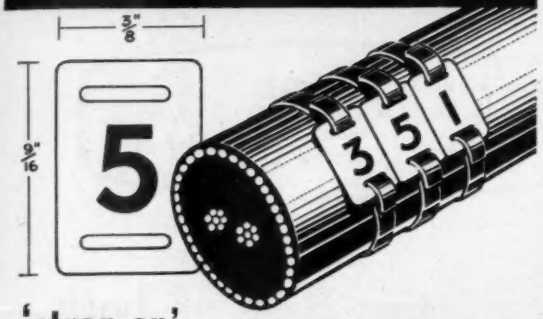

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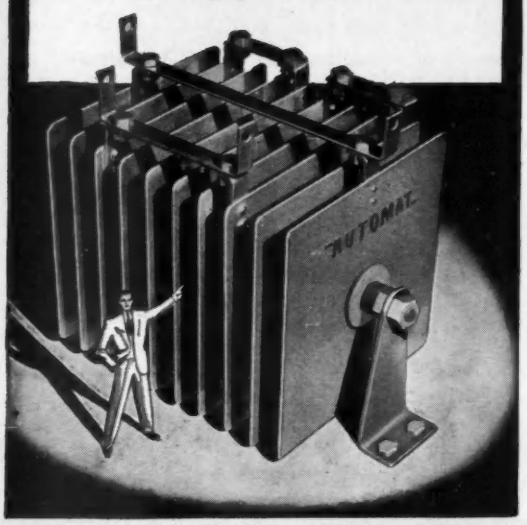

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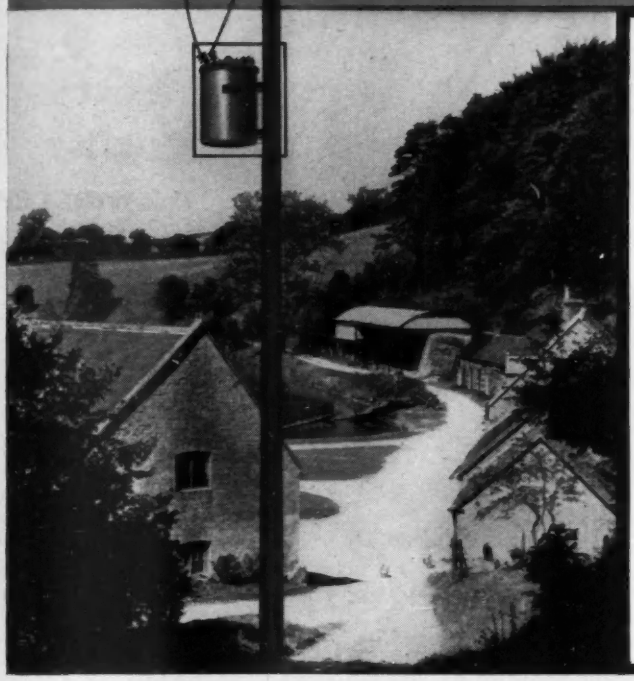

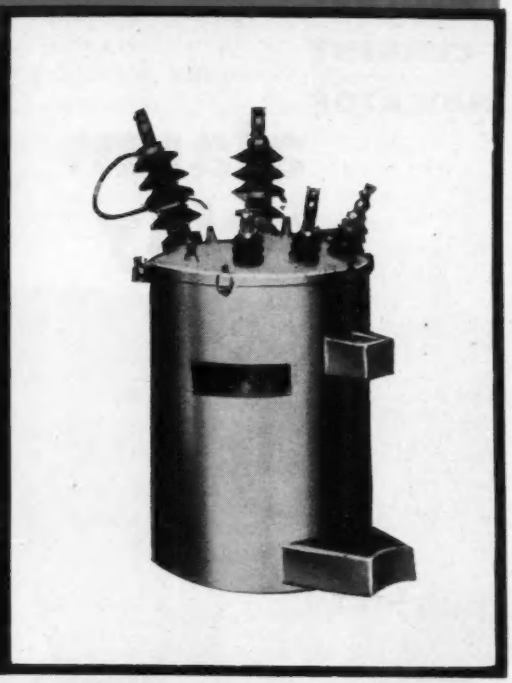

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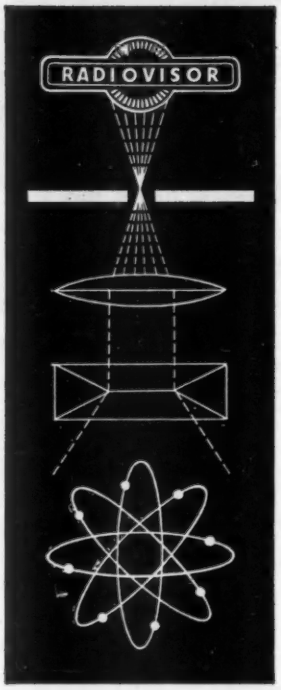

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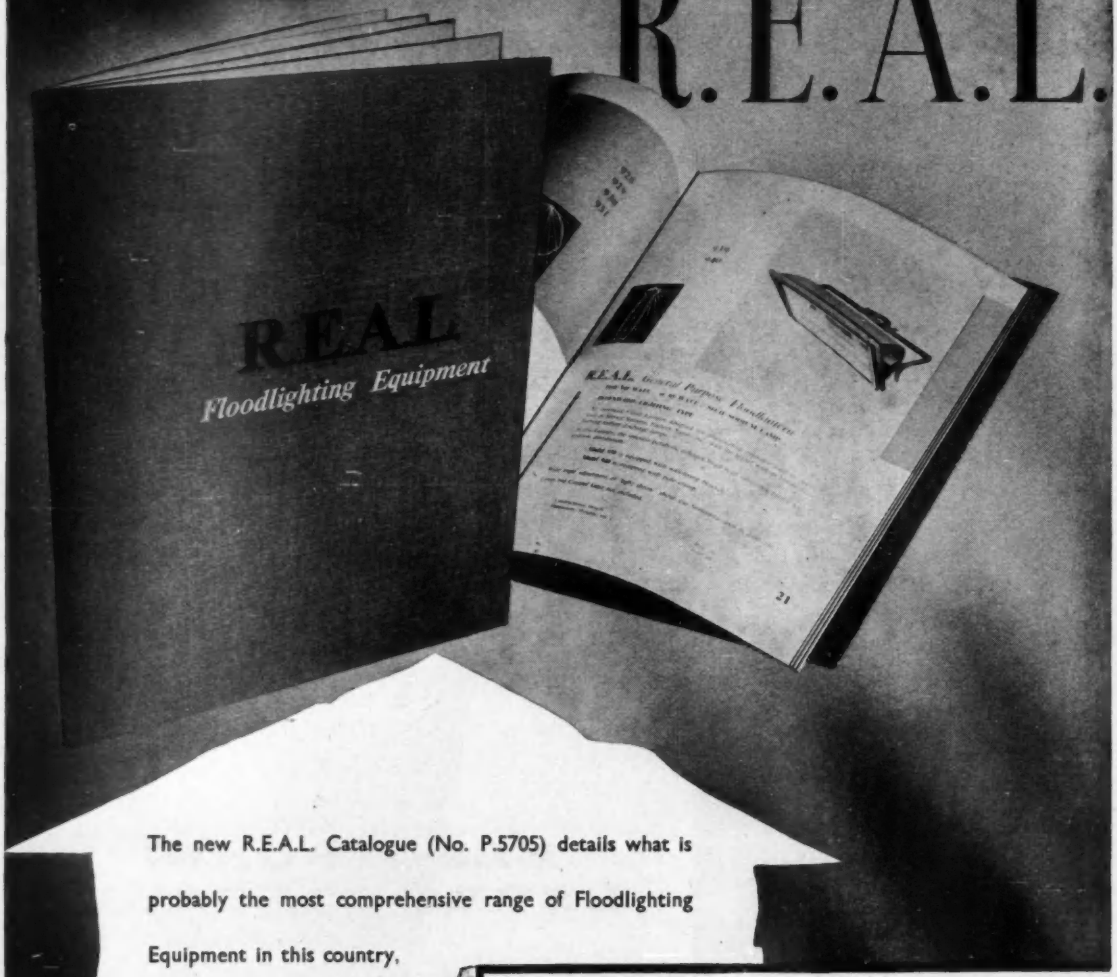

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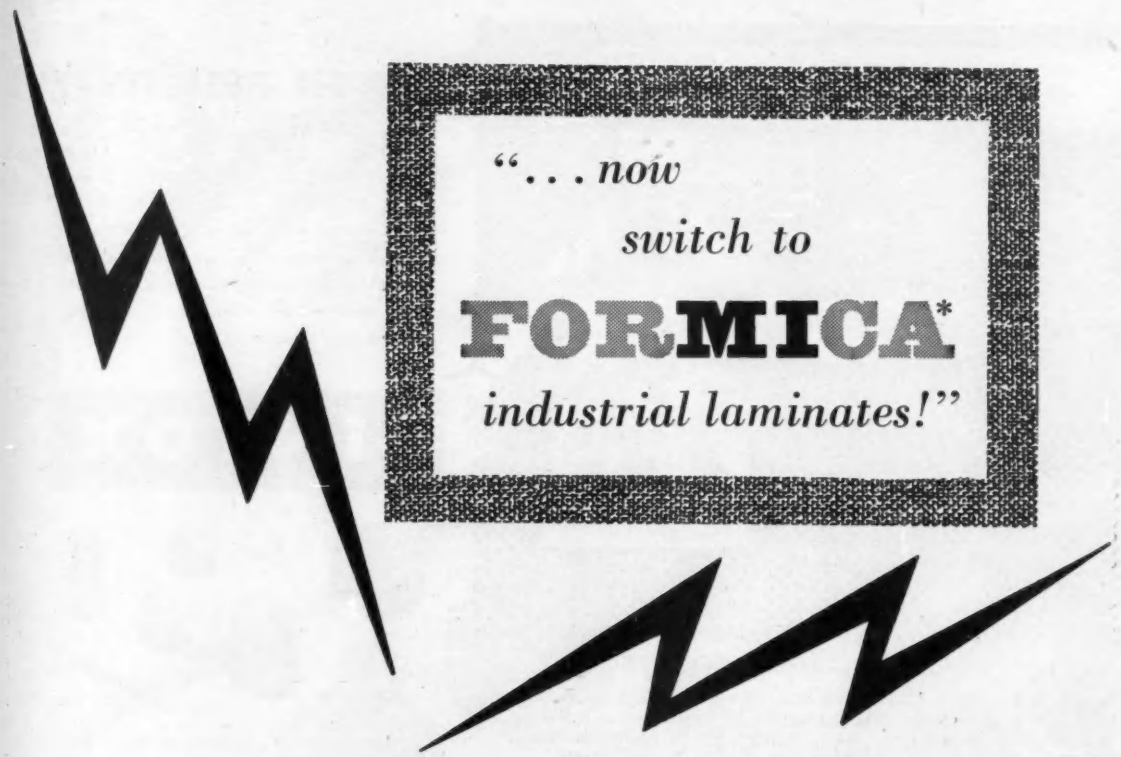

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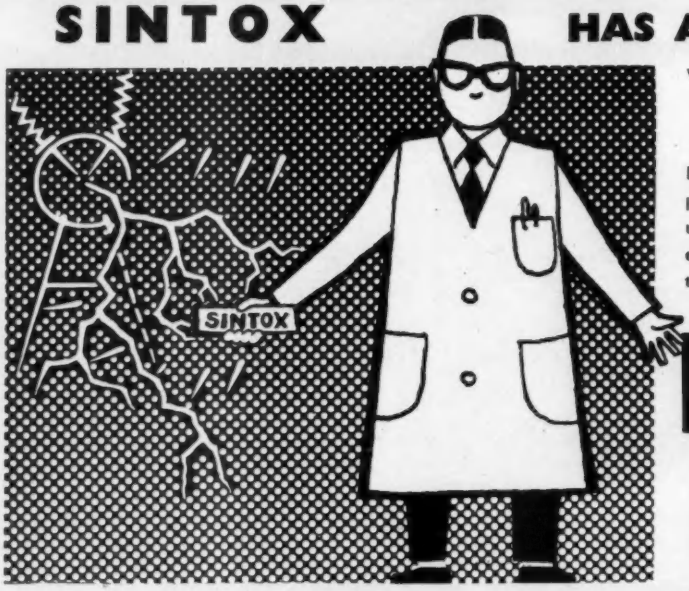

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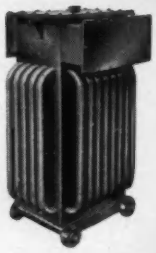

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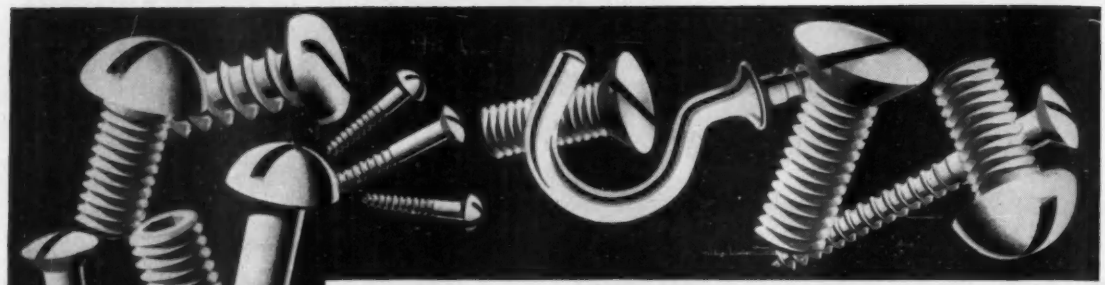

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21 FEBRUARY 1958

ELECTRICAL REVIEW

Managing Editor: HUGH S. POCOCK, M.I.E.E. *General Editor:* J. H. COSENS *Technical Editor:* P. W. TUCKER, M.I.E.E.

In This Issue

A Great Advance	331	News of a contract for a boiler and turbo-alternator with a capacity nearly three times that of the latest in construction, two years short of commissioning, has been received by the electrical industry as fairly normal development. This great achievement involves a boiler with an output in electrical terms of 550 MW and equipped for re-heating, but details of the turbo-alternator are not yet available
I.E.E. President	*Facing* 332	Portrait of Mr. T. E. Goldup, C.B.E.
Mass Production Methods	333	Many of the larger electrical manufacturing concerns consist of several completely separate production units each based on the following and other principles: the careful selection of machines as related to purpose; the maximum use of mechanical handling devices; the careful selection of labour and provision for training; and the organisation of factory production and production flow
Data Recording	339	In this I.E.E. paper the author deals with faults in magnetic tape data recording and their causes
Manufacturing Progress in 1957—Crompton Parkinson, Ltd.	349	Continued efforts made by Crompton Parkinson, Ltd., to develop their production resources and products in 1957 are reflected in the substantial volume of orders and contracts received, and the demand for many of the company's products reached a new high level
Contractors' Dinner	352	Electricity load factor, appliance approval, installation inspection, European Free Trade and industrial relations were among the topics in the speeches at last week's function
London Electricity Board Contracts	354	Decision to institute investigation into the Board's Special Contracting Department and reported transactions with the Maybridge Construction Co.
Domestic Electrical Equipment—Electric Irons	364	Illustrated review of the various models of electric and electric/steam irons now on the market, with details of loading, weight, finish and price

✧ ✧ ✧ ✧

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VOLUME 162 NUMBER 8 ✧ *Eighty-Sixth Year of Publication* ✧ FRIDAY PRICE 1s 6d

Editorial, Advertising and Publishing Offices: Dorset House, Stamford Street, London, S.E.1. Telegraphic Address: "Elecrev, Sedist, London." Code: ABC. Telephone No. Waterloo 3333 (60 lines). Registered at the General Post Office as a Newspaper. Entered as Second Class Matter at the New York, U.S.A., Post Office. Annual Subscription: Home £4 15s 0d; Overseas £5 15s 0d: U.S.A. and Canada $16.00. Cheques and Postal Orders (on Chief Office, London) payable to ELECTRICAL REVIEW PUBLICATIONS LTD. and crossed "Lloyds Bank."

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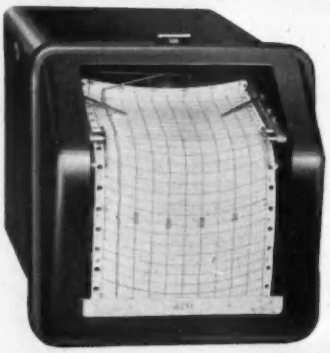

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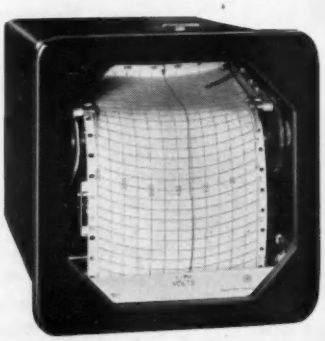

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ELECTRICAL REVIEW

21 February 1958 Vol. 162 No. 8 Established 1872

A Great Advance

WHEN, many years ago, to take only one of a few similar examples, the decision to install a 100 MW turbo-alternator at Battersea was announced, this caused quite a stir in the electrical industry. The announcement in last week's issue of the *Electrical Review* of the awarding by the Central Electricity Generating Board to International Combustion, Ltd., of the contract for the boiler of a 550 MW generation unit for a new power station to be situated at Thorpe Marsh, near Doncaster, has been accepted quite normally. While the earlier development savoured rather of experiment, this latest one has been received as just another stage of normal progress.

In view of the unit design, construction and operation of boiler and turbo-alternator sets for the station, it is a pity that separate announcements are necessary for both the boiler and the turbo-alternator components. Such practice is bad for both technical and publicity reasons, at least. One thing is sure, however, the first separate announcement about the boiler has increased speculation as to the form the turbo-alternator will take. All we have to go on at the moment is the reference by the Central Electricity Authority in December, 1956, to "set sizes of 275 MW with a single shaft tandem compound arrangement of the turbine, or a 550 MW set with a two-shaft cross compound arrangement where two generators are employed."

Such formations appeared at that time to be dictated by the maximum weight that could be transported by road (*Electrical Review*, 7th December, 1956). Nevertheless whatever form the turbo-alternator set will be shown to take, the fact remains that at this stage, say a couple of years before the most advanced station in construction so far—namely High Marnham with its 200 MW units—can be in operation, contracts are now being placed for a unit of nearly three times the capacity of those yet to be commissioned. That is a great advance.

We shall probably hear a repetition of the criticism that too many eggs are being put into one basket. It would seem that such a station as Thorpe Marsh with two 550 MW units, will refute the idea that in the future the base load will be carried by nuclear power stations, leaving the two-shift and peak-load operation to coal-fired stations. It seems improbable that a station with two 550 MW sets will be used for anything but base load work.

This 3,750 klb/hr boiler (550 MW equivalent) represents further progress in steam conditions (2,400 p.s.i. and 1,055 deg F, with reheat to the initial temperature), although the advance is perhaps not quite so much as might have been expected having regard to the much greater capacity of the generating plant. In any case it seems that as we get nearer to the critical pressure (3,208 p.s.i.) this term seems to lose its magic.

When completed High Marnham will have an installed capacity of 1,000 MW in five 200 MW units, whereas Thorpe Marsh will have two 550 MW units giving an

aggregate capacity of 1,100 MW. The capital cost of High Marnham will be low judged by present-day standards, and that of Thorpe Marsh may be even lower, but perhaps we have yet to see the effects of introducing dual turbo-alternators.

LONDON BOARD AND CONTRACTORS

Readers studying the report on page 352 of the matters relating to the Contracting Department of the London Electricity Board may wonder how that Board came to be concerned in work at the Marchwood power station, Southampton—far distant from the London area. Briefly, the circumstances are as follows:—

Before the nationalisation of the electricity supply industry Edmundsons Electricity Corporation, Ltd. (whose business was vested in the British Electricity Authority) had a substantial and successful contracting department. Upon acquiring this the B.E.A. considered it expedient to pass it over to the London Electricity Board which has since continued to operate the department, undertaking installation work including contracts at power stations such as Marchwood.

APPROVED CONTRACTORS

Mr. H. S. Wathes, president of the Electrical Contractors' Association, referred at the Association's dinner last week to the National Inspection Council for Electrical Installation Contracting. He indicated that, while the N.I.C. had the wholehearted support of the E.C.A., it was feared that on a voluntary basis the success of the scheme was doubtful. The Council had recruited only a "handful" of contractors who were not already members of the two contractors' associations.

While it is true that members of the E.C.A. and the E.C.A. of Scotland constitute the great majority of enrolled contractors, the "handful" of others is fairly substantial—about 550 out of a total of 3,600. It has to be remembered that the scheme has been operating only for about a year and so has hardly had time to make itself felt. Only by adequate publicity and the support of public bodies can it achieve the desired effects—the elimination of undesirables from the electrical contracting business and the supervision of enrolled contractors to ensure that they are keeping to the rules. It is in genuine contractors' own interest that the scheme should be effective. However attractive compulsory registration may appear the prospect of achieving it is so remote that all concerned will be advised to make the best use of what is already to hand.

DIVERSITY IN GENERATION

The U.S.A. view of the differing domestic habits of English and French people as an economic factor in the decision to lay the cross-Channel cable (which was referred to by "Reflector" a few weeks ago) is, of course, correct as far as it goes. Diversity in times of usage of electricity for a number of purposes should materially improve the combined load factor. There is another aspect also—that is the example the connection is likely to provide of the economic value of diversity of generating sources that feed into a common high-voltage network as a means of making the best use of the characteristics of each.

Associating hydro-electric stations with more flexible steam plant may avoid waste of water through spillage from large reservoirs and, on the other hand, counteract the effects of drought. Peak-loads can be carried by hydro plant served by reservoirs of only limited capacity, sometimes in conjunction with pumped storage, while run-of-river stations make their own contributions as conditions permit. Within the next few years, too, the desirability of running atomic power stations as near full load as possible owing to their relatively high capital costs and certain operating features will come to the fore.

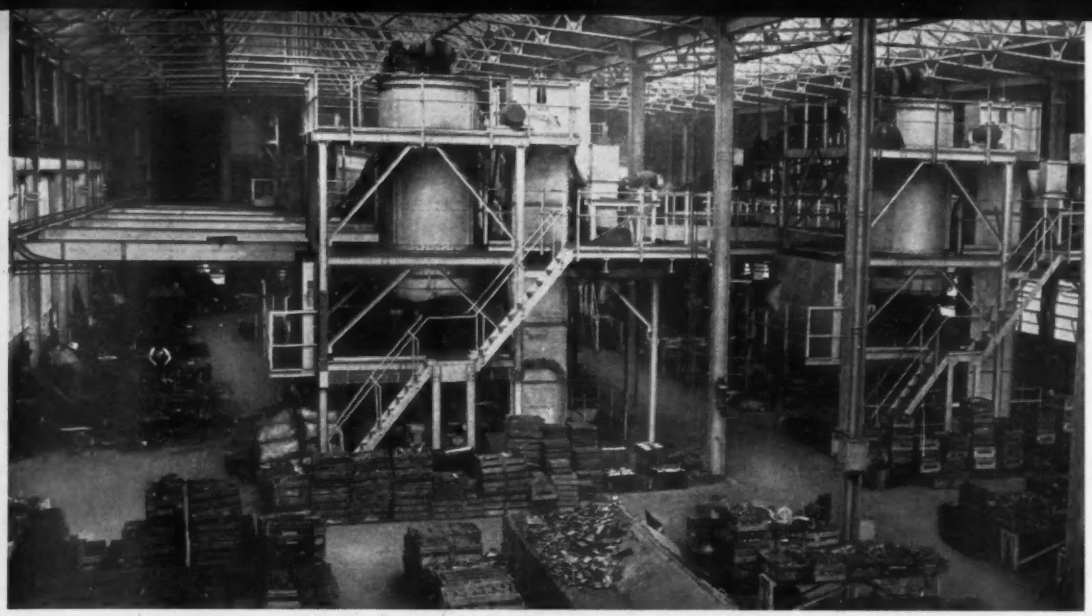
Mr. T. E. GOLDUP, C.B.E.

THIS session's President of the Institution of Electrical Engineers, Mr. T. E. Goldup, is a prominent member of the radio profession. He was born in London in 1894 and was educated at the Royal Naval College, Greenwich. He joined the research staff of the R.N. Signal School, Portsmouth, in 1914 as a lieutenant and in 1918 became a senior experimental officer there. His connection with Mullards began in 1923 as an assistant in the Valve Laboratory of the Mullard Radio Valve Co., Ltd. After a period as technical assistant to the works manager, he was appointed head of the Technical Service Department in 1928. He was elected a director of Mullard Equipment, Ltd., in 1938, of the Mullard Radio Valve Co., Ltd., in 1940 and of Mullard, Ltd., in 1951.

Mr. Goldup was chairman of the Radio Communication & Electronic Engineering Association in 1953 and he is chairman of governors of the Ministry of Supply School of Electronics, Malvern. He serves on committees of the British Standards Institution and on the Radio Research Board. He was chairman of the I.E.E. Wireless Section in 1943–44 and became a vice-president of the Institution in 1952.

Mr. T. E. GOLDUP, C.B.E., M.I.E.E.

PRESIDENT OF THE INSTITUTION OF ELECTRICAL ENGINEERS



Mass Production Methods

Flow-Line Work in the Electrical Industry

By R. W. S. MACKAY*

TO Henry Ford the world owes a debt of gratitude firstly for his idealistic conception of providing cars and trucks for the multitude, at prices they could afford to pay at a period when only the few could enjoy these luxuries, and secondly for planning the production methods whereby his objective was achieved; methods which later became known as mass production.

To-day mass production in the electrical industry, and indeed in any industry, follows the same basic principles as those first enunciated by Ford, of maximum utilisation of machines and manpower, and as the demand has grown for a wide variety of products required to meet the ever-expanding standards of living, so mass production methods have been applied by many manufacturers, to the great benefit of all users.

The products to which mass production methods can be applied must, of course, be in substantial demand and be highly simplified and standardised in type. In the case where an entirely new product is to be marketed, the manufacturer must be reasonably certain that it will create a rapid and substantial demand to warrant the capital outlay which mass production methods impose.

In the large modern factory employing these methods, accurate and up-to-the-minute statistics are vital at all levels. It is normally the responsibility of the chief sales executive to forecast and record the quantities of each product which he reckons will be sold monthly over a period of six or twelve months. The production cycle may vary, of course, in different factories from three to six weeks, although the monthly cycle is more common. The more accurate this forecast the better will be the service to the customer and the profit to the company.

The sales forecast or budget is vitally important as it will, in effect, be used subsequently as the basis for the works production plan. Properly organised, this plan will ensure that the required quantities of all articles forecast by sales will be delivered into the stores each production cycle, and from this reservoir of stock of standard lines orders will be executed. It will also be appreciated that upon this forecast of sales such matters as balance of plant, works personnel and the purchase of raw and other materials, will be related.

For these and other good reasons it would obviously be unwise to depend upon "hunches" or predilections when framing this important document. The forecast should be approached on the principle that "foresight is 90 per cent hindsight" and that accurate analyses of sales will prove the best guide. Thus a graphic record of home and export sales should be maintained which records the monthly sales throughout the year and a separate graph should be provided for every listed product sold. From these graphs it should prove a simple matter to assess the quantity of each product which is normally required to fulfil the average demands of customers month by month.

Other factors may impose themselves at the time of forecasting sales, i.e. competition, trade trends, Government legislation, purchase tax, etc. In these matters it can only be left to the wisdom, knowledge and experience of the chief sales executive to use his own judgment to best advantage and adjust his figures upwards or downwards, as the occasion demands. In most cases, however, such

The title picture is a general view of the M.E.M. foundry where two fully mechanised moulding plants are in use. In the foreground are the sand preparation units which are connected to the batteries of moulding machines by conveyors

* Midland Electric Manufacturing Co., Ltd.

factors should not influence the levels denoted by the individual graphs by more than 10 per cent under normal conditions of stable business.

Now, having briefly outlined the responsibilities of the sales organisation, we can move on to the techniques of mass production within the factory. These may be briefly summarised, as follows:—The careful selection of machines as related to purpose; the maximum use of mechanical handling devices; the careful selection of labour and provision for training; the provision of suitable incentive schemes to ensure maximum output of operatives by common agreement; the organisation of factory production and production flow; and the operation of an efficient costing system.

Many of the larger electrical manufacturing concerns consist of several completely separate production units, each functioning on the above principles, and the degree of overall organisation is apparent in the extent to which the separate units are co-ordinated to give maximum output of the finished product.

In one well-known switchgear factory, castings, porcelain, plastics, pressings and extrusions represent some of the widely differing component parts produced by self-contained departments and the co-ordination of their efforts is wholly dependent on good organisation and management.

Careful selection of machines as related to purpose. The selection of plant and machinery must be based on an accurate assessment of machine loading. As the nature of the machine work for most electrical products is invariably repetitive, it is frequently found that the speeds of operation will show a marked improvement from the time of installation and allowance must be made for this. It is not uncommon to find an increase of 30 per cent in output twelve months after the installation of a new process. Incidental operator movements can be studied and improved upon over a period and the conscious efforts of the operator tend to become automatic after a time.

All machinery should provide some flexibility of operation in order to accommodate variations in quantity and design and the periodic review of machine loading enables the equipment to be kept up to date and ready for the demands that are likely to be made upon it.

In some of the larger factories in the industry where a high degree of standardisation and simplification in design has evolved, components which are common to a wide range of finished products and the quantities of components to be produced are, therefore, very substantial, it is not unusual for quite special purpose machines to be designed and developed by the methods and production engineers to attain speedy production at low cost. Sometimes it is necessary, under such conditions, to sacrifice some of the refinements of established engineering practice. For example, in the operation of drilling machines it will be appreciated that there are certain feeds and speeds which are recognised to be ideal from the point of view of the economic use of drills and maintenance. To balance this output with other operations it may, nevertheless, be found more satisfactory to forego the maximum drill life in favour of balanced output.

Maximum use of mechanical handling devices. Mass production of any description demands the rapid removal and handling of material and goods at all points within the factory, to ensure that the operation of machines is in no way impeded. The importance of efficient handling cannot be over-emphasised.

A study of machine/operator output, using earlier techniques than those available to-day, frequently revealed that too much machine/operator time was used to handle the goods being produced, to the detriment of actual production. The devices available for mechanical movement and handling of goods within the factory are, of course, undergoing continual change and improvement. These range from the simple gravity roller conveyors and power driven belt conveyors to highly elaborate mechanical hands with automatic operation, for changing the direction and the feeding of components directly to and from machine tools.

"Automation," a word given recent prominence in the popular Press, is hailed as inaugurating a new era in industry. Placed in its proper perspective it is no more than the latest development of a continuing and progressive improvement over the years of electrical, electronic and mechanical devices, all blended to produce mechanised movement and automatic machining processes or control to suit a wide variety of applications, all designed to reduce handling and production costs.

The necessity for the expeditious movement of goods and materials within the factory raises the need for careful consideration and study being given to stillages and pallets, etc., which in size, shape and pattern will of necessity be planned to suit the individual needs of each firm's products and handling problems.

The storage of raw material, where large values and quantities of raw material stocks are involved, presents considerable problems, while work in progress and finished products must also receive the care and attention which their movement and careful handling demands.

Raw materials in general are bulky and heavy and require little care in handling. The work in progress, comprising sub-assemblies and manufactured components, are best handled in relatively small quantities, so that they can be conveniently transported and fed to operators. The finished products have naturally to be handled with the greatest care, to avoid blemish or damage to the containing cases of finished products and thus ensure faultless products being delivered to customers.

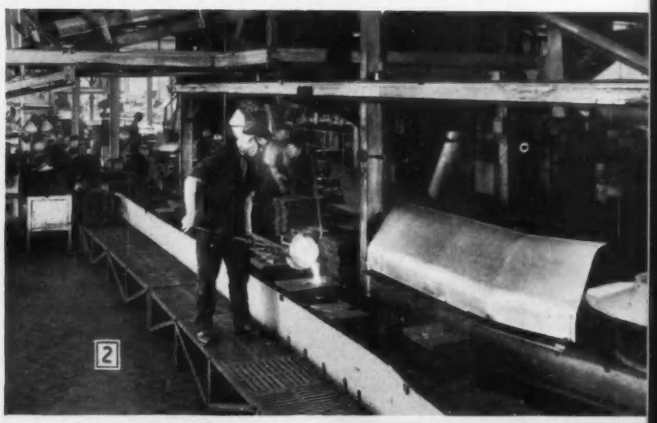
Ideally the number of containers or pallets of different sizes used should be kept to the bare minimum which will permit of the efficient handling of all goods and components. If three standard containers of different sizes can be planned to cope with all movement of components and finished goods, the ideal will have been substantially achieved. The importance of planning pallets, with due regard to the nature and complexity of the components and assemblies, demands a special study to suit individual needs.

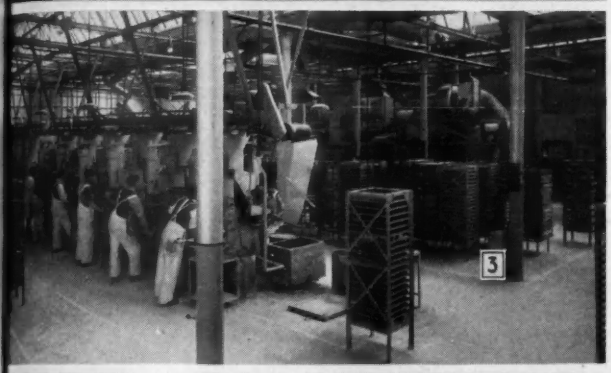
The layout of any mass production factory must, of course, provide adequate gangways of good surface and with clearly defined white lines, within which even a dropped screw would be an offence and a misplaced pallet would be a prodigious crime !

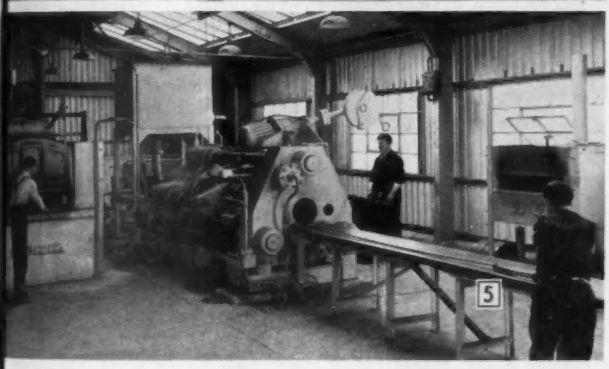
The movement and stacking of pallets in the stores of a modern factory normally involves the use of fork lift trucks, by which means the area of floor space employed for storage is reduced to the minimum.

Where quantities justify the capital outlay, increasing use is being made of overhead circulating storage conveyors which move continuously in snake-like fashion between the stove enamelling plant and the point of assembly, dropping to bench level at the assembly bands and bringing to the operators' hands the highly stove enamelled containing cases and covers for a wide variety of products.

The advantages which equipment of this type offers will prove considerable over earlier methods used to move stove enamelled cases to the assembly bands. Scratching,







1. *Moulding plant in a mechanised foundry. The machines in the foreground work in pairs, producing the upper and lower halves of the moulds respectively. Sand is brought to the hopper above the operator by overhead conveyor and by means of the lever at the side of the hopper he can withdraw just the amount of sand required for a mould. Farther along the line are machines producing complete moulds in less than one minute.* **2.** *After the moulds are made, they are brought by conveyor to the pourer. Molten metal is taken from the cupola by ladles which run on an overhead monorail to reduce fatigue and lessen the risk of accidents. The cupolas are designed to give a continuous flow of metal throughout the day.* **3.** *M.E.M. manufacture all their electrical porcelain. Materials from Scandinavia, France and Cornwall are mixed with clays from Devon and Dorset, and after preparation the resulting clay "body" is moulded into shape on the hydraulic presses shown in this picture.* **4.** *After pressing and a preliminary drying, "flash" must be removed, glaze applied and the pressings cleaned ready for firing. Girls working on each side of a conveyor carry out the fettling and cleaning work. Each working place is provided with air extraction to remove dust from the atmosphere. Glaze is sprayed on automatically before the final cleaning and inspection operation. In the background is the bay in which trucks are loaded for the kiln. Over a million pieces are fired each month in the continuous tunnel kilns which are in operation 24 hours a day, seven days a week.* **5.** *The 500 ton hydraulic extrusion press and billet heating furnace. Brass billets are extruded into 60 different shaped sections for use in the manufacture of switchgear components. The plant is capable of producing 20 tons a week of brass bar up to 1in diameter, or an equivalent shaped section.* **6.** *The smaller components are made in the machine shop where drilling, tapping, screw making, spring coiling and other machines are in use. The number of separate components is astronomic—the screw making machines alone produce seven million screws a month and other components are required in proportion*

As much work as possible is carried out by machines, indeed almost every screw used in the assembly of M.E.M. gear is power driven. This is a battery of automatic screw drivers specially developed for fixing components to porcelain bases

chipping and blemishes to the stove enamel finish will be completely eliminated and the customer can be assured of a well-finished product.

Careful selection of labour and provision for training. In recent years the importance of human relationships in industry has grown, with the tendency for industry to move the skilled craftsmen to the tool room or to supervisory jobs where their skill can be best used to the advantage of the world at large, and to employ semi-skilled mass production labour elsewhere in the factory. While the toolmaker still possesses his old pride in his skill and craftsmanship, and these qualities are still encouraged, it has been necessary in the case of other semi-skilled workers to move the emphasis away from pride in craftsmanship to pride in production. This is usually achieved by the operation of incentive schemes within the wages structure.

As mass production calls for the maximum development of manual dexterity in order to achieve full machine utilisation, the selection and training of personnel is of primary importance. The success of large-scale production is, however, more dependent on the use of correct methods than on the individual skill of the operator. The manufacturing process is reduced to numerous small operations, usually carried out by different operators, e.g. one operator may be required to drill only one hole in one component and it is more important that this operator should be capable of performing the operation rapidly, than that he should have any concern or responsibility for the results of his action, as this particular factor is taken care of by tooling and by the process employed. It is not surprising that an operator engaged day in, day out, on a task of this type must, upon occasion, feel the job monotonous. In practice, experience has shown that the impact of repetitive production on the operator can be reduced considerably by warmth, comfortable seating, morning and afternoon tea breaks when all machinery is closed down, the use of colour in the factory building and on machine decoration and the provision of a high standard of amenities such as first-class canteen, superior toilet arrangements, attractive clothing, etc., all of which combine to counteract greatly the tedious nature of the work. Attention to these matters cannot be too strongly emphasised, as it is largely in these directions that the employer can ensure that employees do not become bored and disillusioned.

The chief attribute which is required of a worker under these conditions is a high degree of manual dexterity, so that the operation becomes automatic as quickly as possible to the operator. This can be achieved in two ways. One is by the provision of a training department, in which manual movements can be developed to simulate the operations on the shop floor to such a point that when the operator ultimately goes on to the job he or she is able immediately to achieve the rhythm of production which is necessary; this training period may be as long as two to three weeks.

An alternative method is to put the operator directly on to the section where he is to be employed and to devote some attention to his training under actual operating conditions, compensating him on a reducing scale until he is proficient. This latter process may take rather longer than the former, but it has the advantage that it tends to select "the sheep from the goats" in the very early days of engagement, as against the disadvantages which arise when an operator succeeds in the training department, but for other reasons than his manual dexterity finds himself to be unsuited to the job.

It is not unnatural in this type of work that the high standard of manual dexterity required frequently appears to be impossible of attainment to the newcomer, just as 120 words per minute shorthand appears impossible to the budding stenographer, and a great deal of encouragement must be given to the trainee if he is working among those who have successfully reached the target.

Such training as this is costly and it behoves the employer to select carefully and having selected to encourage and inspire his personnel, with a view to avoiding a high rate of labour turnover.

Provision of suitable incentive schemes to ensure maximum output of operatives by common agreement. In general, levels of wages and working conditions are regulated by national agreements and local conditions to a considerable extent. Nevertheless, upon or within the framework of these arrangements it is necessary to build a structure of incentives in order to produce the highest efficiency from the labour employed. This necessity is, of course, not confined to the manual operator in any organisation but it is true of all grades and levels of people who earn their living by working, whether as executives or as operators.

The oldest and simplest form of incentive scheme is that of direct money piece-work, but this has many disadvantages. Changes in money values, changes in production techniques and changes in design and products are inevitable and the adjustment of rates to take account of all these factors is difficult and can only be arbitrary. In the modern production unit it is more satisfactory to relate output to time rather than money. This can be based on accurate rate fixing for each process and such rate fixing is not subject to any variation at all. Variations can be taken care of by adjustments to the rate per hour and are much more easily handled in this way.

As far as possible, it is desirable to make incentive schemes individual in their application rather than group schemes and in cases where operators are solely responsible for their own production this can easily be done.

In the case of non-producers or groups of operators whose output can only be measured in bulk, then group schemes are unavoidable, but they should be used as little as possible. One of the most difficult matters to assess in rate fixing is the proper rate of production which represents a normal effort. A good deal of work has been done on this subject and it is now possible by completely breaking down operations into their elementary movements to achieve a standard rating which can be applied throughout. The advantages to be gained nationally by achieving this standard are not generally appreciated but there is no doubt that they are numerous.

The days when the appearance of a stop-watch in a workshop was a signal for a riot have long since gone and workers as well as management now recognise that time study is the fairest way of assessing effort. It is, however, highly necessary that the worker shall agree and willingly accept the basis on which his payment is calculated and to this end the existence of joint consultation in industry provides a channel through which these matters can be discussed. This is not to suggest that every rate fixed time must be submitted to joint consultation but merely to say that the opportunity at all times for an employee to express his opinions on these and other matters affecting his employment provides the atmosphere in which high level production can be maintained.

Automatic screw driver. The components are first loaded on to a jig, the porcelain base placed in position, after which the screws are driven home from the back. The oscillation of the hopper, together with a specially designed slot, ensures that a screw is fed point downwards to the driving position on every operation of the handle. A ratchet is provided which gives any required degree of tension

Organisation of factory production and production flow. Large-scale production must be based upon a plan which is fixed and adhered to and cannot be modified quickly or easily to meet all fluctuations which are inevitable in day-to-day business.

Production must, therefore, be based on the sales forecast or budget which will fix the levels of output for every product for a planned period of, say, six or twelve months and upon which the manufacturing programme will be organised. The cycle of operation will be fixed to suit the particular industry and against each cycle there should flow into finished stores the planned quantity of each product to satisfy the needs of the sales organisation. It will be realised that a high degree of knowledge and skill must be applied to the preparation of the sales forecast if the evils of under- or over-production are to be avoided.

When sales requirements are fixed, production planning can then proceed by breaking down each quantity of products into components and by planning these components down to the ultimate machine on which they will be made. Materials must be requisitioned through the purchase department and deliveries assured to suit the programme of production. Plant must be reviewed and supplemented where necessary and manpower to carry through the programme must be organised. It is common practice to plan production these days right down to the operator on the shop floor, where time and motion study are in operation, with suitable factors for contingencies like absenteeism, tool breakdowns, etc.

One of the aims of planned production is to organise the flow of material through the factory at regular rates to arrive at the final assembly point together, and thus

Final assembly section, where castings, pressings, mouldings and components meet to make the finished switch or motor starter. Each operator adds his or her quota of components as the unit travels along the conveyor band

avoid the build-up of intermediate stocks as far as possible. By reason of the variation in rates of production, some stocks in progress are unavoidable, but these should be restricted to the minimum.

Where mechanical devices are used to a large extent in the factory, machine equipment and tool maintenance are of vital importance and in the interests of production flow it is essential that maintenance should be of the very highest order. Mass production and planned production are synonymous and skill of a very high order is required in the planning.

Operation of an efficient costing and statistical system. It is essential that in such an organisation an efficient cost and statistical system is treated as a matter of vital importance. Electronic and other machines enable accurate up-to-the-minute costs to be available, together with stock and work-in-progress valuations. For such close cost control, vital and speedy information on rates of production, costs of materials, incidence of rejections, etc., are an absolute necessity. It has only proved possible within the scope of this article to touch briefly upon some of the more important matters associated with mass production and to concentrate rather on the basic principles. It is a subject, however, with facets as numerous and as varied as the wide range of processes and complexities of operation which the application of the system creates.

These techniques can be applied to the manufacture of a great diversity of products of all types for which there is a large-scale demand within the electrical industry. The system possesses great advantages which outweigh any minor disadvantages. Once the factory is geared up and becomes in effect a huge single-purpose machine, it will produce products in great quantities, of high quality at low cost, and in the process assist in the expansion of the industry and make some contribution to elevating standards of living, to the general betterment.

English Electric University Scholarships

AT a Press conference in London last week, Mr. G. S. Bosworth, chief, technical personnel administration, for the English Electric group of companies, gave particulars of a new university scholarship scheme which the English Electric Co., Ltd., has founded, and also of an industrial fellowship scheme introduced by the company. Sir Charles Snow, a director of the English Electric Co., welcomed the Press and stressed that a high standard of natural intelligence was a first requisite, although character was also important.

Under the university scholarship scheme up to twenty scholarships will be awarded each year, to provide education and training for young men who may be expected to attain senior technical or management positions in the engineering industry. The first scholarships will be offered for the academic year of 1958-59.

The scholarships are each worth £450 a year, tenable for three years at a university in the United Kingdom. Holders will read for an honours degree in engineering, applied science or mathematics, or any subject allied to advanced technology. The awards will not be restricted in any way by the level of the parents' incomes, or other financial resources, so as to give the widest choice of candidates, and complete freedom for the holders to participate in university life. (A figure of £450 has recently been mentioned by the National Union of Students as an acceptable standard for full attendance at a university.) Candidates who already hold an open university or State award will still be eligible for this scholarship.

Training will be divided into three parts, a period of residence at a university, industrial training with one of the companies of the English Electric group (including the Marconi companies, D. Napier & Son, Ltd., and the Vulcan Foundry, Ltd.), followed by a salaried staff appointment, where, it is hoped, scholars will stay with the group for at least the minimum two-year period. Industrial training will follow the pattern of the established graduate apprenticeship schemes and the salary will be £600 a year. This apprenticeship period conforms with the requirements of the professional institutions, and together with the subsequent two-year staff experience, will qualify the successful trainee for corporate membership of his appropriate professional institution.

The scholarships may be held at any university in Britain and are open to children of British parentage who qualify for entry to a university honours degree course. The co-operation of headmasters is being sought in the initial choice of candidates and they are being asked to nominate boys with both outstanding mental capacities and wide interests.

This year, the English Electric Co. also hopes to award twelve industrial fellowships worth £750 a year for a two-year post-graduate training in management and engineering manufacture. The first four of these fellowships were awarded in 1956 and so successful has this specialised training proved, that the company has decided to extend it. The industrial fellowships are offered to young men holding a degree, or its equivalent, in engineering, physics or mathematics, and have already shown powers of leadership and organising ability.

The purpose of the fellowships is to supplement existing post-graduate schemes and to provide specialised training for young men capable of becoming engineer-administrators responsible for top-level organisation, planning and control. The training includes detailed study of management problems in a group concerned in a number of fields of engineering, and with a wide range of products, as well as practical experience in investigation and study projects.

The new university scholarship scheme and industrial fellowships will in no way curtail the group's established craft, technician, student and graduate apprenticeship schemes.

South African News

SPEAKING at the annual dinner of the South African Institute of Electrical Engineers in Johannesburg recently, Mr. H. C. Koch, president of the Transvaal and Orange Free State Chamber of Mines, said that the Rand and Orange Free State gold mining industry consumed over a third of the total electrical output of South Africa in 1956. They faced one problem—where to find the men to build, maintain and operate the vast mechanised world of the future. Industry was spending enormous sums of money each year exploring new fields of production, but that production would be seriously hampered if there were not the qualified men to staff the various projects.

Cape Town City Council recently agreed without discussion to raise a loan of £5 million for extensions to the new Athlone generating station.

Data Recording

Performance of Magnetic Tape Systems

By C. D. MEE, Ph.D.*

Author's summary of the paper entitled "Magnetic Tape for Data Recording" which was presented to the Measurement and Control Section of the Institution of Electrical Engineers in London on Tuesday last.

THE application of magnetic tape storage in data handling equipment has been limited only by the rate at which information may be recorded on tape without incurring excessive errors between the reproduced and the original signal. For some applications of data storage, momentary reductions of the reproduced signal amplitude are tolerable provided that their rate of occurrence is low. In other cases, where reproduction without error is essential, as in digital computers, it is possible to avoid occasional faults if they are due to permanent tape defects and their position is known. One purpose of the paper to be described is to investigate the occurrence of errors in data recording and to relate them to magnetic tape defects or to faults of the record-reproduce system. Conditions for the most likely methods of fault-free recording and reproduction may then be established along with a performance specification for satisfactory magnetic tape. It is necessary, therefore, to test tape in a way which will locate possible faults for any system of data recording, and a suitable test apparatus is described.

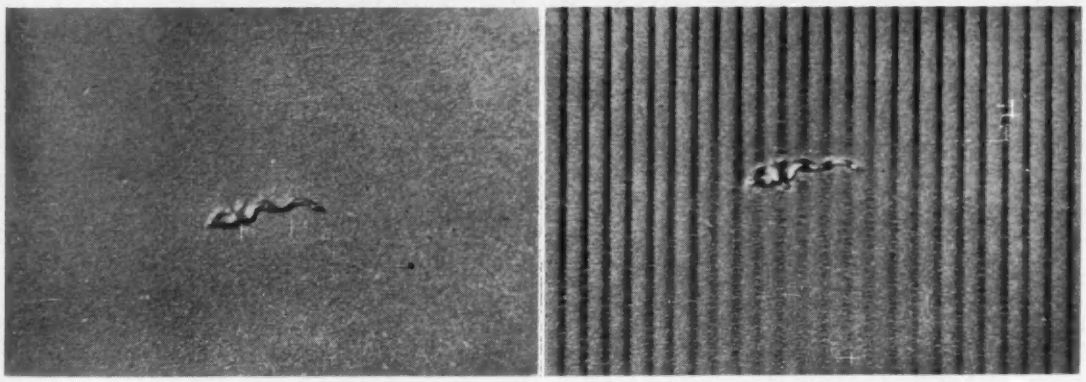
Whatever method of recording or reproducing is used in an application of tape to data recording, the aim is to reproduce faithfully the number of pulses in the signal to be recorded and to maintain their time sequence. In other words, the signal, consisting of a series of pulses spaced in time according to some predetermined code, must be reproduced without any loss or addition of pulses to the original signal. The most common fault occurring in magnetic recording tape is one which momentarily separates the tape from the record or reproduce head and thus causes loss of amplitude of the reproduced signal.

* Mr. Mee is with C.B.S. Laboratories, New York.

In data recording, it is only necessary to know whether a pulse exists or not at any given time. A reduction in amplitude of the reproduced signal can therefore be tolerated provided the pulses can be distinguished from the accompanying noise. When the reproduced signal falls below this limit the resulting loss of information is called a "dropout." A typical tape fault capable of causing a dropout is shown in Fig. 1a, which is a photograph of the surface of the magnetic layer on the tape at a magnification of ×30. The foreign material embedded in the magnetic oxide lacquer is a sliver of the plastic base material.

Non-return-to-zero Recording

The recording system having widest application is one which magnetically saturates all parts of the recorded track in the longitudinal direction of the tape. The direction of magnetisation changes through 180 deg in accordance with direction changes of the field in the gap of the record head. A test recording of this type (known as non-return-to-zero recording) with 200 reversals of magnetisation per inch of recording is shown in the region of the described tape fault in Fig. 1b. Surface magnetic fields exist where the magnetisation suddenly changes direction in the tape, and these fields are made visible in Fig. 1b, using colloidal magnetite as an indicator. The vertical black lines are due to agglomerations of the small particles of magnetite around the regions of maximum surface field. The blurring and intensity reductions of the deposits in the lower half of the photograph are due to the reduction of recording field strength when the fault lifts the tape away from the recording head. Where this separation loss has occurred a similar loss will occur again on reproduction.



(a) (b)

Fig. 1 (a).—Foreign matter embedded in magnetic oxide lacquer and (b) effect of embedded foreign matter

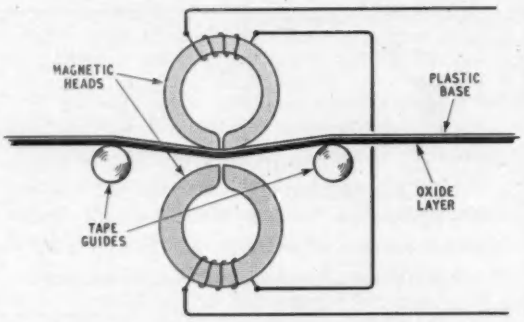


Fig. 2.—Diagram of two-head record-replay system

The total loss of signal will constitute a dropout if the signals are not sufficiently distinguishable from the system noise. It can be seen that where loss of recorded signal occurs, the surface fields as indicated by the magnetite particles are less sharply defined in the region of the fault and some loss of recording definition has occurred. The effects on the severity of dropouts of varying the head gap dimensions and the recording field strength is considered for both non-return-to-zero and return-to-zero recordings.

Observations of the causes of dropouts with conventional record-reproduce systems indicate that the majority are caused by momentary separation of the tape from the head. A new double-head record-reproduce system is described (Fig. 2), where two transducer heads are rigidly mounted with their gaps parallel to each other but on opposite sides of the tape. The tape is run with its plastic backing in contact with one head in such a way that the magnetic oxide layer is equidistant from the two gaps. With this system, the majority of tape faults, which cause separation loss with conventional recording, produce a slight increase of the reproduced signal amplitude. In this case, as the tape moves away from one gap the loss of signal is compensated by a gain in the opposite head gap.

An experimental electronic dropout tester is used to evaluate various tapes and recording systems. The functions of the apparatus are to detect when any one of a number of reproduced test signals is attenuated by a predetermined fraction of the normal maximum reproduced voltage; register this event either as a permanent count or by stopping the tape machine; register, as a permanent count, the number of reproduced pulses whose amplitude falls below the predetermined fraction; detect reproduced voltages of a predetermined amplitude occurring on reproducing a unidirectionally saturated tape.

The counting of spurious noise pulses in the last item is a necessary feature of a universal dropout tester since a fault-free tape is one which neither adds nor loses pulses from the original signal. The equipment is designed to test multitrack recordings, and the pulse density may be varied in order that the test can simulate actual working conditions. The electronic circuitry is of the type commonly used in digital computers.

An examination of dropouts occurring on samples of commercially available tapes shows that provided sufficient care is given to the production of a uniform magnetic lacquer with no foreign particles, and provided the tape is manufactured under dust-free conditions at all stages, then tapes having cellulose acetate or polyester bases are superior to others in immunity to dropouts. The inherently low susceptibility of polyester base material to moisture absorption and its resistance to tearing have made it the more favourable for data recording. It is adequately shown that most dropouts are due to faults which momentarily lift the tape from the record or reproduce head. Many removable faults with acetate base tapes are due to chips of base material. Permanent faults are also due to base defects, such as dents in the base material or small air bubbles, and it is concluded that future progress towards flaw-free tape depends largely on the availability of better base material. In conclusion, reasonable dropout limits are postulated for the economic use of present-day high quality tapes. Upper and lower discrimination limits are set on the reproduced signal amplitude and a satisfactory tape would have no dropouts which reduce the signal below the upper limit and no noise pulses which reach the lower limit.

Lightweight Submarine Telephone Cable

RECENTLY H.M. Telegraph Ship *Monarch* sailed from London to carry out laying trials of a new lightweight deep-sea submarine telephone cable which has been developed by the Research Branch of the G.P.O. Engineering Department. The trials will be carried out in depths of about 2,700 fathoms in the North Atlantic.

For over 100 years, deep-sea cable has been made by taking a simple cable of insulating material and copper, which has then been made strong enough to lay in deep water by winding a layer of steel wires round it. This method of construction means an uneconomical use of steel and heavy cable. Such a cable also suffers from the disadvantage of tending to twist when under tension and to form kinks when it is being laid or recovered.

These and other disadvantages have been overcome by the Post Office invention of a lightweight cable which has no external armour wires, all the necessary strength coming from the heart of the cable itself. The cable is in fact built around a "neutral" or non-twisting steel rope. Many problems in connection with such a basically new design, for example, jointing and gripping without damage, have arisen. But solutions have been found and satisfactory sea trials carried out, and it is proposed to use a single cable of this type, with British-type two-way rigid repeaters, for the transatlantic telephone cable to be laid between the United Kingdom and Canada in 1961.

Although the lightweight cable is very much easier to handle than conventional cable it cannot solve all the problems associated with laying a submarine cable equipped with a large number of rigid repeaters. The conventional method of controlling a cable when it is being laid by a cable ship is to pass three or four turns round a cylindrical drum or capstan, the shaft of which is equipped with a powerful brake. But the modern two-way repeater is housed in a steel cylinder about 9ft long and weighing half-a-ton, and obviously cannot be passed round a normal paying-out drum.

On these present trials the *Monarch* will be testing a method being developed by the Post Office in which the cable drum is replaced by a number of braked sheaves coupled together. The cable passes over these in a zig-zag fashion without making any complete turns. A steel rope is spliced to the cable at points ahead of and behind each repeater so that when the latter reaches the laying gear, the wire replaces the cable on the sheaves and the repeater passes to one side in a slack loop of cable.

VIEWS on the NEWS

By REFLECTOR

IN these days the electrical Press is naturally concerned with many aspects of railway working, such as traction, signalling and all kinds of amenities for passengers which depend on electricity. A reminder that this interest is of long standing was given at the meeting of the Institution of Railway Signal Engineers on 12th February when Mr. J. H. Currey presented his paper "The B.T.C. Automatic Train Control System." A speaker in the discussion recalled that a system of A.T.C. using magnetic inductors had been tested in this country some fifty years ago, and that its principles were criticised by a railway signal engineer of the day in letters to the technical Press on the grounds that the apparatus would not necessarily "fail to safety." "I remember this," the speaker added, "because I used to type his letters to the *Electrical Review*."

* * *

In these days of radio, long-playing gramophone records and tapes, I was surprised to learn from a recent announcement by the Post Office (*Electrical Review*, 31st January) that there are still people interested in supplying recorded music over their own wires to shops, restaurants and factories. Older readers may remember the activities of the Electrophone Company, which, in association with the National Telephone Co., relayed church services and performances from London theatres. According to H. T. Baldwin's *History of the Telephone in the United Kingdom* there were 600 subscribers in 1907, twelve years after the company started operation, and they had a choice of 30 churches and places of entertainment. The theatre lines were terminated at the exchange and the subscriber had a switch to enable him to connect his line to either the telephone or the "Electrophone" apparatus. This had jacks for two sets of four receivers. In the early days the two Ader transmitters were either mounted on a heavy lead base and supported on rubber pillars, or suspended from floor brackets by rubber bands. Later, a granular transmitter was satisfactorily adapted to "Electrophone" working. Though no doubt a novel and pleasant experience at the time, the quality must have been very "Low Fi" by modern standards, especially when the instruction issued in 1896 not to place the transmitters near the base drum and trombones was not followed. All is not progress, however, since the Postmaster General's latest concession does not allow "live" performances or cover distribution to private houses.

* * *

Two or three weeks ago I mentioned the conversion of an Edinburgh church into a substation by the South of Scotland Electricity Board. At the time I recalled that a number of small chapels had been thus turned to secular use. In the January-February issue of *London Electricity* Mr. C. P. Croft describes something of the kind with a distinct difference. In this case it is a specially-built "chapel" abutting on a Roman Catholic church at Streatham (London) in a style harmonising with that of the church. It was erected early in this century and the conditions of sale attached to the site insisted that the building should be constructed in stone similar to that of the church and should "cause no noise, vibration or annoyance to the priest for the time being of the church."

* * *

For a long time there were complaints from tenants of blocks of flats about the exorbitant prices their landlords were charging for electricity. It is, however, surprising to hear that this is still going on. The matter was discussed at a recent meeting of the South Eastern Electricity Consultative Council. The chairman said that the matter would be considered by the Retail Tariffs Committee early in March. Section 29 of the Electricity Act, 1957, deals specifically with this matter, giving the Electricity Boards power to fix maximum charges for re-sold electricity. When this has been done overcharged consumers can recover excess payments.

* * *

In my 7th February note I commended a Gas Board's generosity in lending its theatre at Eastbourne for a protest meeting against electricity charges. I am informed by Mr. E. S. Parris, a local electrical contractor, who is also a member of the Eastbourne and District Chamber of Commerce, who called the meeting, that my praise was unwarranted—the theatre was hired and paid for.

* * *

Seventy years ago the question of installing "the" electric light was discussed at a town's meeting at Exeter. Mr. C. J. Wharton, as reported in the *Electrical Review* of 24th February, 1888, said:—

> "Exeter was in his opinion remarkably favoured for the production of the electric light, because of its natural situation, and the water force which was at present daily running to waste. He suggested the formation of a local company, of which the consumers should be the shareholders. To light the streets of the city by arc lamps would probably cost about £20 per lamp per annum, while the incandescent lamps for domestic purposes would only cost ¼d per hour. Mr. Massingham, in relating his experiences of electric lighting at Taunton, said that the experiment there had been an unqualified success. The light was to be seen everywhere in the streets, and internally from a church to a billiard-room. Not only had the company paid a dividend of 5 per cent, but they had carried forward a balance representing an additional dividend of 2 per cent. Taking into consideration the water power, he believed electricity could be produced 20 per cent cheaper at Exeter than at Taunton."

Supply was commenced in the following year but I cannot find any record of the use of the "water force."

CONSULTING ENGINEERS' DINNER

THE Association of Consulting Engineers held their annual dinner at the Dorchester Hotel, Park Lane, on Monday last with Mr. Bryan Donkin in the chair. The toast of the Association was proposed by Lord Mills, K.B.E., Minister of Power. He said that the discoveries and inventions of our scientists and engineers gave no rest to the consulting engineer, who must keep abreast of the times in the interests of their clients. The importance of the Association, and of the work performed by its members, was that it was intimately linked with capital projects at home and the supply of capital goods and services overseas. As Minister of Power, Lord Mills said that he had a particular interest in the work consulting engineers were doing for the industries for which he was responsible. One important part was the large modernisation projects which were being put in hand by the Coal Board. The design, specification and supervision of construction of power stations, high-voltage electric transmission lines and substations was another item of particular interest to him.

There was a temporary halt in the amount of work that was being carried out by the nationalised industries, but he reminded his audience that the total amount of investment would remain on a very high level and it was the Government's sincere wish that it should be possible before long to resume the advance. He referred to the falling off in recent years in the proportion of work carried out by the consulting engineers for the electricity authority in this country, but there was tremendous promise in nuclear energy that would make heavy demands on our scarce reserves both of skilled manpower and of capital resources. Both the Government and the electricity authorities were very alive to the problems which had arisen for members of the Association and he said that the Generating Board was ready to discuss the new situation with the consulting engineers so far as it was in their power. In this, they would have the support and close attention of the Minister of Power.

He suggested that the Association should not lose sight of what it had already achieved and what was being currently achieved. He had no doubt that a strong and independent body of consulting engineers with great engineering skill and experience in all types of work all over the world was a great national asset and was capable of expanding its activities in the future.

Letters to the Editor

Letters should bear the writers' names and addresses, not necessarily for publication. Responsibility cannot be accepted for the opinions expressed by correspondents.

Bakelite Lampholder Fault

I HAVE frequently encountered trouble with Bakelite lampholders. The plain portion of the barrel which carries the bayonet slots is usually nearly the same size as the root diameter of the threaded portion. Consequently, when such a holder has been in service for a few months the heat from the lamp has distorted the Bakelite, rendering shade ring removal extremely difficult. Moreover, during this operation, part of the Bakelite often breaks away exposing the brass liner.

I believe these faults could be overcome by adopting a larger diameter thread and making the shade rings a very easy fit.

Solihull, Warwicks. C. A. BAKER, M.P.O.A.

What Every Dealer Should Know

I SUGGEST that Mr. Banner should try to have a look at a retailer's stock of boxes as received from the makers. The variety of descriptions or lack of descriptions is amazing.

The retailer's customer always works from the end not from the beginning. "Two-way switches" usually means two-way adaptors. Listening to a customer describing what he wants or intends to put on to a multi-plug sometimes causes shuddering. He has spent an odd hundred pounds or so on an item of equipment and then is quite recklessly prepared to spend another two or three shillings to fix it up. "What! 7·044; but look how much it will be. I want a plug. You see, the wire runs across the yard to the wash-house and the wife wants to be able to change the wire from the washer." With visions of a wet woman standing on a wet floor fiddling about with a live plug or socket you prescribe a switch-socket firmly screwed on to a firm support, earthed on to a tap. How the electricity really gets to the work point and how the woman gets out of the wash-house is a mystery.

Two sixteen-year-olds have told me: "We are going to run the wires under the road and fix the meter up as we are going to keep tropical fish in a shed at the end of his garden."

From another source: "We never went to the Electricity Office; we got 'So and So,' a lorry driver, and he did it in half-an-hour." A 15 A live main switch fuse was changed and the lorry driver is still alive.

Middlesbrough. G. W. LEADER.

Electrical Safety

REFERENCE is made to the following paragraph which appears in an article on the subject of "Electrical Safety—Accidents in Factories Analysed," published in the *Electrical Review* of 31st May, 1957.

> "The current waveform of fluorescent lamps allows of currents in the neutral of a three-phase four-wire supply that may be 50 per cent greater than that in the line. Addition of capacity to improve power factor worsens the position, for example, a ratio of neutral-to-phase current of 20 per cent became 47 per cent after correction to a p.f. of only 0·8."

Tests taken on an installation here do not substantiate this. I am wondering whether the writer of the article or reader would mind amplifying the statement by theory and perhaps by test results.

Obviously the matter is important and I would appreciate help. I am an engineer in a Government Department.

Victoria, Australia. H. H. FORDER.

PERSONAL AND SOCIAL

News of Men and Women of the Industry

The United Kingdom Atomic Energy Authority has appointed **Dr. H. Kronberger,** O.B.E., F.Inst.P., to be director of research and development in the Authority's Industrial Group. Dr. Kronberger is to succeed Mr. L. Rotherham, M.Sc.,M.Inst.Met., whose appointment as a member of the Central Electricity Generating Board was recently announced.

Dr. Kronberger took an honours degree in physics at King's College, Newcastle, and the Ph.D. degree of Birmingham University. In 1944 he joined the wartime atomic energy project (Tube Alloys) under the late Sir Francis Simon. He went to Harwell in 1946, shortly after the Establishment was formed, and worked in the General Physics Division under Mr. D. W. Fry. In 1951 he joined the Capenhurst Laboratories of the Industrial Group and subsequently became head of laboratories where he was primarily responsible for the development of diffusion plants for the separation of the uranium isotopes. He was appointed chief physicist at Risley in 1956 and was awarded an O.B.E. in 1957.

Mr. J. C. Duckworth, B.A., F.Inst.P., A.M.I.E.E., deputy chief engineer (nuclear power), has been appointed chief research and development officer of the Central Electricity Generating Board. After gaining first-class honours in physics, Mr. Duckworth joined the Telecommunications Research Establishment in 1939, in charge of the division engaged on the design of ground radar stations for the R.A.F. In 1946, he went to Ontario and worked on the Chalk River project. Returning to this country in 1947, he went to the Atomic Energy Research Establishment at Harwell, where he supervised a group working on neutron spectroscopy involving measurements work concerning nuclear reactors. He became chief engineer of the Ferranti laboratories, Wythenshawe, in 1950, and in 1954 was appointed nuclear power engineer with the C.E.A. subsequently becoming deputy chief engineer (nuclear power) in January last year.

Mr. J. C. Duckworth

The Council of the Radio Communication and Electronic Engineering Association announced on 14th February that as from 1st March the name will be changed to the Electronic Engineering Association. **Mr. F. S. Mockford** (Marconi's Wireless Telegraph Co., Ltd.) was ere-elected chairman for the ensuing year, and **Mr. V. M. Roberts,** O.B.E. (British Thomson-Houston Co., Ltd.), was elected vice-chairman.

The Minister of Power has appointed **Mr. F. C. Braby,** M.C., D.L., B.Sc.(Eng.), M.I.Mech.E., chairman and managing director of Frederick Braby & Co., Ltd., as chairman of the Industrial Coal Consumers' Council in succession to **Sir Ernest Smith,** who retired on account of ill-health.

Mr. J. A. C. Kendle, of the Siemens Edison Swan Electric Co., Ltd., has been elected chairman, and **Mr. B. W. Pickup,** of Falk, Stadelmann & Co., Ltd., vice-chairman, of the Association of Manufacturers of Electric Wiring Accessories. Mr. Kendle and Mr. Pickup have also been elected chairman and vice-chairman, respectively, of the Accessories Section of the British Electrical and Allied Manufacturers' Association.

Mr. K. J. Ley, press officer at the Ministry of Health, has been appointed chief press and broadcast officer to the General Post Office in succession to **Mr. W. S. G. Smele,** who is joining the Commonwealth Relations Office and will shortly be leaving for Canada to take charge of the United Kingdom Information Service post at Montreal.

Mr. N. F. Brand has been appointed a director of Heyes & Co., Ltd., electrical engineers, of Wigan. He joined the company in 1935 as a junior draughtsman and became chief engineer. Mr. Brand will retain his interest in the technical departments of the company but will be primarily concerned with sales management. Mr. J. Heyes succeeds Mr. Brand as chief engineer.

Mr. W. J. Walpole has been elected a director of Lumenated Ceilings, Ltd. He was actively associated, as London manager, with the founding of the company in 1954, and was appointed general manager last year. Mr. Walpole has been concerned with lighting engineering for many years, and before joining Lumenated Ceilings, Ltd., was in the Lighting Department of Siemens.

Mr. J. H. Mayes, general sales manager of the Northern Aluminium Co., Ltd., has been appointed to the board. Mr. Mayes joined the company in 1934 in the technical section of Banbury Works. Three years later he transferred to sales and he was head of the sales development division from 1946 until 1952 when he took up the position of castings and forgings sales manager. In 1953 he was appointed export sales manager and in 1956 became assistant general sales manager. He was appointed to his present position as head of the Sales Department in April last year.

Mr. J. F. Wright, M.I.E.E., A.M.I.Mech.E., has been appointed deputy chief engineer of the South Wales Electricity Board in succession to **Mr. J. S. Lombard,** who took up the duties of chief engineer at the beginning of this year.

Mr. J. F. Wright

Mr. Wright, at present sub-area engineer in the Board's Central Sub-Area, based on Cardiff, commenced his service in the electricity supply industry at Ipswich and served successively in several sections of the municipal undertaking there and with the former Central Electricity Board. In 1939 he joined the Swansea electricity undertaking where he held the appointments of chief technical assistant and, later, generation engineer at Tir John power station, a position he held until 1948 when he was appointed to his present position with the South Wales Board.

Mr. E. Lloyd Thomas, M.I.E.E., A.C.G.I., has been appointed chief development engineer of R. B. Pullin & Co., Ltd. Mr. Thomas was educated at the City of London School, City and Guilds College, and London University, specialising in communications. In 1937 he was appointed radio engineer in the development laboratory of the Plessey Co., Ltd., and was mainly concerned with cathode-ray direction-finding equipment during the war. He joined the Sperry Gyroscope Co. in 1945, initially as development engineer on electronics and instruments, and subsequently became equipment engineer on G.W. control systems. In 1952 he was appointed chief research engineer with Short Brothers & Harland,

Mr. E. Ll. Thomas

Belfast, with whom he built up a team for work on automatic control systems for aircraft and missiles. He was responsible for the development of the Short analogue computer.

Mr. G. C. Fairbanks, M.I.P.E., a deputy general manager of Elliott Brothers (London), Ltd., has been appointed a director.

Mr. Fairbanks joined Elliott Brothers in 1930 as a toolmaker. In 1933 he became supervisor of the Admiralty Gyro Department, and by the end of the war he was shops superintendent at the company's Lewisham factory. In the reorganisation immediately following the war Mr. Fairbanks was appointed production manager at Lewisham, and subsequently he assumed various senior executive positions including his appointment, two years ago, as a director of the Fisher Governor Co., Ltd., and Bristol's Instrument Co., Ltd., both Elliott subsidiaries.

At a meeting of the board of Brook Motors, Ltd., on 11th February, **Mr. David Brook,** son of the chairman, Mr. Frank V. Brook, was co-opted on to the board. Mr. David Brook, who has been with the company six years, has occupied an executive position with the company since his return from service in the Royal Electrical and Mechanical Engineers.

Mr. D. Brook

Mr. K. H. Randall, export director of Smiths Clocks & Watches, Ltd., left this country on 11th February for an overseas tour; he will be visiting Hong Kong, Singapore, Australia, New Zealand, South Africa, Rhodesia and East Africa.

Mr. J. A. Aked, M.B.E., M.I.E.E., has joined A. Reyrolle & Co., Ltd., as their manager in Scotland. Mr. Aked, who recently retired from the South of Scotland Electricity Board, will operate on a part-time basis from the Reyrolle office at Woodlands Terrace, Glasgow. **Mr. J. Bucknall** will continue as assistant manager.

Mr. F. Livingston Hogg, director of Livingston Laboratories, Ltd., left on 25th February for a six-week visit to North America. He will attend the I.R.E. show and convention in New York during March, and will also visit leading manufacturers of electronic equipment on both sides of the continent.

Mr. P. L. Martin, an accountant trainee with the Brush Electrical Engineering Co., Ltd., Loughborough, has been awarded the Leverhulme prize of the Institute of Cost and Works Accountants for cost accountancy in the final examination. The George Russell Memorial prize for first place in the intermediate examination has been won by **Mr. N. H. Aitken,** technical sales engineer, employed by R. A. Lister & Co., Ltd., London.

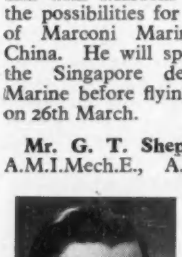
Mr. H. A. C. McKay, of the Chemistry Division, Atomic Energy Research Establishment, Harwell, has been appointed director of the Baghdad Pact Nuclear Training Centre from July next in succession to Mr. W. J. Whitehouse.

At the annual general meeting of the Domestic Electrical Appliance Section of the British Electrical and Allied Manufacturers' Association held on 12th February at the Connaught Rooms, London, W.C.2, **Mr. A. M. Parkinson** (English Electric Co., Ltd.) was elected chairman and **Mr. B. MacFadden** (Bulpitt & Sons, Ltd.) vice-chairman. Mr. W. Gilchrist, chief commercial officer of the Merseyside and North Wales Electricity Board, was the principal speaker at the luncheon which followed.

Mr. B. S. Whitty, has been appointed a director of P. W. Baker & Sons, Ltd., who act as a central purchasing and supply organisation for the British Thermostat Companies. **Mr. W. C. Hopkins,** who has been connected with the parent company for many years, is also joining the board.

Mr. H. C. Maguire, export sales manager of the Marconi International Marine Communication Co., Ltd., left London Airport on Tuesday last for Hong Kong, where he will consult with Mr. A. J. Locke, manager of the company's Hong Kong service depot, and with Marconi (China), Ltd., on the possibilities for further marketing of Marconi Marine equipment in China. He will spend two weeks at the Singapore depot of Marconi Marine before flying back to London on 26th March.

Mr. G. T. Shepherd, B.Sc.(Eng.), A.M.I.Mech.E., A.M.I.E.E., A.C.T. (Birm.), who writes in this issue on "Some Factors Affecting the Operation of Nuclear Power Stations," was educated at King Edward's School, Birmingham, after which he served an apprenticeship with the General Electric Co., Ltd., at Witton. After three years in the transformer and the switchgear drawing offices, Mr. Shepherd became a graduate trainee with the City of Birmingham Electric Supply Department. Later, following several positions at Hams Hall "B," Portishead, Kirkstall and Skelton Grange power stations, Mr. Shepherd became deputy station superintendent at Skelton Grange. Since 1954 he has been engaged on nuclear power work and at the present time is nuclear services engineer (operation) with the Central Electricity Generating Board.



Mr. G. T. Shepherd

Mr. H. Sellers has been appointed commercial manager of Livingston Laboratories, Ltd. Mr. Sellers is well known in the electronics industry in his former capacity of sales manager of Marconi Instruments, Ltd.

Mr. E. E. R. Fuchs, M.I.E.I., A.I.Loco.E., has joined Ruston & Hornsby, Ltd., Lincoln, as personal assistant to Mr. T. L. Kendall, sales director. Mr. Fuchs received his early training at a Tyneside shipyard. After studying in Switzerland, he joined the English Electric Co., Ltd., at Rugby in 1938, and was engaged on diesel engine research and development. Later he became technical delegate in the Middle East for the English Electric group, returning to the diesel engine division in 1952 as assistant to the general manager. In that capacity he specialised in the export activities of the division and travelled overseas extensively.

Mr. E. E. R. Fuchs

Mr. H. Schofield, C.B.E., Ph.D., B.Sc., who has been chairman of Crabtree Electrical Industries, Ltd., for the past fourteen years, has resigned the position of chairman, but retains his seat on the board. **Mr. J. A. Crabtree,** M.A., succeeds Dr. Schofield as chairman.

Servomex Controls Ltd., announces that **Dr. J. Douce,** of Manchester University, has been retained as consultant to advise on theoretical problems arising in the field of non-linear control systems, and systems subject to random fluctuations.

The opportunity was taken at this year's annual dinner of the **Crompton Parkinson (Chelmsford), Ltd.,** foremen and senior staff, to present awards to fifteen men and two ladies with forty years' service, and to thirteen men with twenty-five years' service. The presentations were made by Mr. J. V. Daniel, managing director of Crompton Parkinson, Ltd. In addition to these awards, the special presentation of what is known as the "Turner Award" was made for the first time. This was initiated by Mr. W. C. C. Turner who has served with the company since 1898. The award arises from a Trust Fund set up by Mr. Turner and will be made annually to the employee at the Chelmsford Works who shows loyalty to the company in the most marked degree with special regard to diligent service, interest in his work and/or

influence on his fellow employees. The first award—a £60 cheque and an illuminated certificate—was made by the trustees to Mr. W. B. Welham of the Winding Section Machine Department, who has been with the company for forty-seven years, and received the award, on this occasion, from Mr. Turner.

Mr. F. J. Lane, O.B.E., M.Sc., M.I.E.E., chief transmission engineer of the Central Electricity Generating Board, is relinquishing his post at the end of the month to join the partnership of Messrs. Preece Cardew & Rider, consulting engineers. Mr. Lane has served twenty-seven years in the electricity supply industry, twenty-four of which were spent at the headquarters of the Central Electricity Board and the Central (formerly British) Electricity Authority. He was appointed transmission design engineer to the Authority in March, 1948, and was promoted to deputy chief engineer (transmission) in 1954. In these positions he has been closely concerned with the design, development and construction of the 275 kV supergrid and with the investigations leading to the decision to lay across the English Channel, between Dungeness and a point near Boulogne, a cable linking the electricity supply systems of Britain and France.

Mr. F. J. Lane

Mr. J. L. Egginton, B.Sc., M.I.E.E., assistant design engineer of the South of Scotland Electricity Board, has been appointed chief transmission engineer of the C.E.G.B. with effect from 1st March. Mr. Egginton was educated at the City and Guilds (Engineering) College and subsequently served an apprenticeship with the English Electric Co., at Stafford. After a few years in the Sales Department of that company he joined Messrs. Kennedy & Donkin in 1928 and for seven years worked on the construction of the grid system. In 1935 he was appointed an assistant engineer at the headquarters of the C.E.B. When the industry was reorganised in 1948 he went to Edinburgh as chief assistant engineer (system design) of the South East Scotland Electricity Board. This Board was superseded by the South of Scotland Electricity Board in 1955 and since that year Mr. Egginton has been working in Glasgow as system design engineer, responsible for the design of all transmission and distribution in the South of Scotland.

Mr. S. F. C. Whitmore, manager of the Chilterns Sub-Area of the Eastern Electricity Board, is being released by the Board for about three months from mid-June to mid-September 1958, to assist in the organisation and direction of a course in business and public administration at the University College of the West Indies in Kingston, Jamaica. These courses are designed to train men throughout the Caribbean who will be required to carry increasing responsibilities following the Federation of the Islands, and the Administrative Staff College, Henley-on-Thames (which Mr. Whitmore attended for three months in 1952), is providing the director of studies for the course, which will employ many of the methods used at Henley. In July 1956, Mr. Whitmore attended H.R.H. the Duke of Edinburgh's Study Conference on the Human Problems of Industrial Communities within the Commonwealth and Empire. He was one of twenty group chairmen chosen from the United Kingdom.

Mr. R. W. S. Mackay, who writes on "Mass Production Methods" in this issue, received his technical education at the Royal Technical College, Glasgow, and served an apprenticeship with Yarrow & Co. Later he became chief draughtsman in Siemens Brothers & Co., Ltd., Marine Department, and then spent some years acquiring further electrical contracting experience in factory, house, church and school installations. During this period he designed and installed what was probably the first prefabricated (factory assembled) electrical wiring system for Lord Weir's steel house programme, to relieve the housing shortage after the first world war. Mr. Mackay has read papers on switch and fuse gear design to the Electrical Societies of Glasgow, Paisley and Edinburgh. From 1923 he was sales representative for J. H. Tucker & Co., Ltd., West of Scotland. He joined the Midland Electric Manufacturing Co., Ltd., in 1926 as technical sales representative for Scotland, and was appointed assistant sales manager at the company's head office in 1929. In 1938 he became sales manager, and in 1946 sales director.

Mr. R. W. S. Mackay

OBITUARY

Mr. T. S. Parkinson, A.M.I.E.E.—The death occurred at his home at St. Helens on 14th February of Mr. Thomas Smith Parkinson, a former borough electrical engineer of Leigh, Lancs., and district engineer of the North Western Electricity Board's Leigh District. Mr. Parkinson, who retired from the latter post owing to ill-health last September, was sixty-four. He received his technical training at Barrow Technical College and Manchester College of Technology and after serving his apprenticeship at Barrow held positions with the Barrow, Salford and Blackburn electricity undertakings. Before his appointment at Leigh he was deputy borough electrical engineer and manager at St. Helens. He served for a time on the Committee of the Mersey and North Wales Centre of the Institution of Electrical Engineers.

Mr. J. P. Wooller, who retired in 1948 as commercial assistant to the Beckenham electricity undertaking, died on 6th February. He served with the Beckenham undertaking for forty-two years.

WILLS

Mr. D. McR. Massie, deputy chairman of Donald Macpherson & Co., Ltd., who died on 5th September last, left £24,188 gross (£8,345 net).

Mr. W. J. Scarff, Cromer district manager for the Eastern Electricity Board, who died on 28th September last, left £4,160 gross (£4,010 net).

Mr. L. P. Tappin, M.Sc., A.M.I.E.E., district commercial engineer at Barnard Castle to the North Eastern Electricity Board, who died on 30th July last, intestate, left £4,302 gross (£4,050 net).

Mr. H. Nutton, M.B.E., A.M.I.E.E., principal of Wimbledon Technical College, 1943-47, and previously headmaster of Wimbledon Technical School for Boys, who died on 4th October last, intestate, left £11,938 gross (£11,640 net).

Mr. W. N. Sugden, a former director and secretary of Parmiter, Hope and Sugden, Ltd., who died on 24th August last, left £83,498 gross (£82,208 net).

Mr. J. H. Weaver, a director of Edmundsons Construction Co., Ltd., previously contracts manager with Electricity House, Ltd., a subsidiary of the Yorkshire Electric Power Co., who died on 27th June last, left £8,028 gross (£7,718 net).

Mr. B. P. Boyle, M.I.E.E., at one time export manager of the Brush Electrical Engineering Co., Ltd., who died on 7th September last, left £3,440 gross (£3,210 net).

Mr. A. H. Goude, of 103, Barons Keep, W.14, manager, head office sales, A.E.I. Lamp and Lighting Co., Ltd., previously manager in charge of lamp and lighting sales at Plymouth and Birmingham, who died on 27th September last, intestate, left £5,075 gross (£4,834 net).

Mr. B. W. Livermore, director of Keith Blackman, Ltd., who died on 7th October last, left £9,671 gross (£9,546 net).

Mr. J. E. M. Barnes, A.M.I.C.E., M.I.Mech.E., A.M.I.E.E., formerly with the old Callender's Cable and Construction Co., Ltd., in Shanghai and Hong Kong, who died on 5th October last, left £9,704 gross (£9,498 net).

Dr. R. W. Bailey, formerly consulting research engineer to the Metropolitan-Vickers Electrical Co., Ltd., who died on 4th September last, left £5,746 gross (£5,689 net).

Mr. F. Crush, formerly manager of the Ipswich branch of the General Electric Co., Ltd., who died on 19th August last, left £3,239 gross (£3,156 net).

Admiral Sir Aubrey C. H. Smith, K.C.V.O., K.B.E., C.B., a director of Standard Telephones & Cables, Ltd., and other companies, who died on 6th October last, left £29,998 gross (£26,558 net).

Mr. G. F. Tew, head of W. H. Tew & Co., electrical contractors, who died on 20th November, left £8,355 gross (£7,954 net).

Mr. W. T. Anderson, M.I.E.E., M.I.Min.E., formerly contract consulting engineer to W T. Glover & Co., Ltd., who died on 8th August, left £16,563 gross (£16,233 net).

PARLIAMENTARY REPORT

Trade with East Germany

Manufacturers of electrical goods and radio and TV sets are among the industrialists who want the Government to take more positive action to encourage trade between Britain and East Germany, Mr. Ian Mikardo told the House of Commons last week.

Other European countries had unofficial trade agreements with East Germany and there were East German purchasing missions in Frankfurt, Paris, Brussels, Amsterdam, Rome, Ankara, Oslo and Copenhagen. Only London was left out.

Mr. Vaughan-Morgan, Minister of State, Board of Trade, said the Government could not negotiate a trade agreement with the East Germans because we did not recognise their authorities as a Government. There was a barter system which helped to increase our exports.

A serious disadvantage of the barter system was that the trade tended to be concentrated in a few hands, because the arrangement of the deals was so complicated. The F.B.I., in consultation with other national trade associations, had been having discussions with the East German Chamber of Foreign Trade and he understood that the possibility of informal trade agreements had been fully covered. Unfortunately the United Kingdom considered that the proposals put forward by the East German body were one-sided and unacceptable, but the negotiations had not been broken off. If the trade associations reached a satisfactory agreement, the Government would willingly make arrangements to allow it to be implemented.

L.E.B. Inquiry

Mr. Charles Hobson asked the Paymaster General what general direction he had given to the Central Electricity Generating Board and the Area Boards concerning the allocation of contracts and sub-contracts to firms whose personnel were associated with the C.E.G.B. and Area Boards.

Sir Ian Horobin replied that no direction had been given. The award of contracts was a matter within the commercial discretion of the Boards. Board members were, however, required by the Minister's regulations to disclose their interest in any contract made or proposed to be made by the Board, and not to take part in any deliberation or decision of the Board with respect to contracts where they had an interest. Officers of the Board were subject to ordinary commercial practice.

Mr. Hobson said that the work formerly done by electricians employed directly by the L.E.B. was now being performed by the Maybridge Construction Co., of which the major shareholder was the head of the Board's Contracting Department. Was the Minister satisfied that this was in the best interests of the L.E.B., and was this one of the matters which would be referred to the inquiry which the Minister was setting up?

Sir Ian Horobin said it had been announced that an inquiry was to be held into the special contracting section of the Board and in the circumstances it would be best to await their report before going any further.

Mr. Robens asked if the inquiry would be in public, so that the House could have the chance to discuss it.

Sir Ian said the inquiry was not of a type which it would be possible to hold in public but the report would be published.

Mr. Herbert Morrison said that the incident which had been brought to the public notice by Mr. Hobson was causing much public concern. Was it not a thing which ought not to be possible? Would the Minister consider making regulations whereby any officer or employee of the Board would have to declare his interest in any concern which had, or might have, contracts with the Board? Was it not profoundly important for the reputation of the publicly-owned industries that this sort of thing should be impossible?

Sir I. Horobin said he had much sympathy with Mr. Morrison's observations but he thought it would be better to await the report before going into matters which might, or might not, turn out to be relevant.

Mr. Shinwell asked if it would not be desirable to remove any suspicion regarding the activities of those employed by the London Board, or any other Board, for the Minister to issue a general directive intimating that on no account should anybody employed by the Boards be associated with any private company undertaking contracts on behalf of the Board?

Sir I. Horobin said that might, or might not, be the outcome of the inquiry. But it would be unfair to assume that the Board had not done all that they ought to have done.

Capital for C.E.A.

Sir Wavell Wakefield asked the Paymaster General how much of the new capital required by the Central Electricity Authority since the industry was nationalised had been provided by the Authority itself and how much had been provided out of public funds.

Sir Ian Horobin, in a written reply, said that from the date of nationalisation in April, 1948, to March, 1957, the Authority provided about two-fifths of their new capital requirements from their own resources. The balance was provided from stock issues, guaranteed by the Treasury, Exchequer advances and temporary borrowings. He gave the following details: From internal resources, £602 million. From external resources: Exchequer advances, £148 million; stock issues, £816 million; temporary borrowings, £39 million; transfer to South of Scotland Electricity Board, £6 million; less debt redemption, etc., £161 million.

Electricity and Gas Co-operation

Mr. Palmer asked the Paymaster General if he would state the membership and the terms of reference of the committee to be set up by the Government to consider the improvement of co-operation between area electricity and gas boards.

Sir Ian Horobin said that Lord Mills was not yet in a position to make an announcement about this committee but hoped to do so at an early date.

Mr. Robens said that since an inquiry into joint working operations would affect the livelihood of many workers in the electricity and gas industries, would the Minister arrange for representatives of the trade unions to be represented on the committee, or alternatively to be invited to give evidence?

Sir I. Horobin said this was primarily a commercial matter concerned with getting rid of useless competition. It was not necessarily desirable that every conceivable interest should be represented. He would see that Lord Mills was informed of Mr. Robens' observations. Joint meter-reading would certainly be one of the relevant matters.

L.E.B. Scrap Disposal

When future business was discussed, Mr. Charles Pannell asked the acting Prime Minister, Mr. Butler, when the House of Commons could expect to receive the report of the Judicial Committee of the Privy Council on their investigation of the question of privilege concerning Mr. Strauss, M.P. for Vauxhall, and the London Electricity Board, bearing in mind the increasing disquiet in the country about the operations of the Board.

Mr. Butler replied that the Judicial Committee was to sit on 10th March and after its hearings had been completed there would be a report to the House.

Transatlantic Telephone Cable

In a debate on the Post Office and Telegraph (Money) Bill in the House of Lords, Lord Chesham, Lord-in-Waiting, said that the transatlantic telephone cable, brought into service in 1956, had given great impetus to the use of the transatlantic telephone by reason of the improved quality and

reliability of the service. In the service with the United States the traffic had doubled, and with Canada it had trebled since the cable came into use. This growth was much faster than was forecast. In fact the cable itself, which was by way of being a £15 million investment, and which had been expected to pay its way only by 1962, was already operating at a profit.

The Post Office were continuing their close co-operation with the United States to devise technical methods to make even better use of the cable. As a point of interest, the success of this cable meant a good deal to other European countries too. As had recently been announced, a new cable from the United States to France had been planned for 1959. The cable was to be laid by us. We had pursued further researches with the result that an all-British system had been planned in conjunction with Canada, and a new cable, which would be owned jointly by Cable and Wireless, Ltd., and the Canadian Overseas Telecommunication Corporation should be laid in 1961.

Lord Chesham also told of the success of the introduction of automation in the telephone system, and the use of electronics in the handling of mail. The Post Office were also pushing ahead with mechanising the clerical work. For instance, computer equipment worth £250,000 had been ordered for a mechanised pay roll scheme for the 112,000 Post Office employees in the London area. Electronic equipment of this type, supplemented by punched card installations, was being brought into use on a growing scale and was adding to efficiency.

Radiation Antidote

The Minister of Health (Mr. Walker-Smith) informed Sir Wavell Wakefield that the Medical Research Council had for 10 years actively supported work on substances that might protect against the effects of ionising radiations. Substantial progress had been made experimentally but the results were not yet applicable to the treatment of human beings.

PRICES OF MATERIALS

In the accompanying table we give the basis prices of the more important materials used in the electrical industry. The figures given are the selling prices and are those quoted on Tuesday last.

ALUMINIUM ingots	ton £197 0s 0d
COPPER, H.C. Electro	ton £162 15s 0d
Fire Refined 99·70%	ton £161 0s 0d
Fire Refined 99·50%	ton £160 0s 0d
COPPER Tubes ..	lb 1s 7½d
Sheet	ton £187 0s 0d
H.C. wire and strip ..	ton £209 15s 0d
LEAD, English ..	ton £74 5s 0d
Foreign	ton £73 0s 0d
MERCURY	flask £75 0s 0d
TIN, block (English) ..	ton £730 10s 0d
ZINC, G.O.B. Foreign	ton £63 15s 0d
Electrolytic	ton —
BRASS Tubes (solid drawn)	lb 1s 4½d
Sheet	ton —
Wire	lb 2s 2½d
PHOSPHOR BRONZE Wire	lb 3s 4½d
PLATINUM	oz £26 15s 0d
RUBBER, No. 1 R.S.S. spot	lb 23½d—23¾d

Fish Cookery Demonstration

The display centre at the headquarters of the Electrical Association for Women, 25, Foubert's Place, London, W.1, provided the scene on Wednesday of last week for a series of demonstrations featuring the combined craft of a master fishmonger and expert cook on the choice and cooking of fish. The fishmonger, Mr. Len Stockley, head office manager of Mac Fisheries, Ltd., discussed choice, varieties, and methods of cutting and filleting fish, while Miss Gwen Nightingale, who is head of a team of demonstrators and has made a special study of fish and fish cookery, showed recommended ways of cooking on an electric cooker with the accent on grilling.

The display centre is particularly well equipped for such a demonstration as its wide range of domestic appliances includes the latest electric cooking apparatus. Among other things, the audience learned how to judge freshness and how to recognise different species of fish. The many questions asked after the demonstrations proved how receptive women of all ages are to the imaginative presentation of fish cookery and how interesting the whole subject had become.

In view of the response, the E.A.W., in collaboration with Mac Fisheries, Ltd., plan to stage similar demonstration at various electricity centres in many other parts of the country. In each area care will be taken to make the presentation topical both with regard to regional cookery habits and the seasonal nature of fish.

Advisory Council on Middle East Trade

In a written reply in Parliament on Monday last, Sir David Eccles, President of the Board of Trade, announced that the Government had decided to set up an Advisory Council on Middle East trade, the function of which will be to keep the Government in touch with representatives of industry and commerce who have practical experience of selling in the Middle East. The chairman of the Council is Mr. Vaughan-Morgan, Minister of State, Board of Trade, and the vice-chairman and industrial leader, Mr. W. H. McFadzean, of British Insulated Callender's Cables, Ltd. The other members of the Council are: Mr. R. A. P. Bevan (S. H. Benson, Ltd.); Mr. W. R. Beswick (Power-Gas Corporation, Ltd.); Mr. M. R. Bridgeman (British Petroleum Co., Ltd.); Mr. G. C. R. Eley (British Bank of the Middle East); Sir Norman Kipping (Federation of British Industries); Mr. H. G. Nelson (English Electric Co., Ltd.); Mr. T. A. L. Paton (Sir Alexander Gibb & Partners); Sir Henry Spurrier (Leyland Motors, Ltd.); and Mr. Frank Taylor (Taylor Woodrow, Ltd.). Additional members may be appointed from time to time. The Council will also include senior representatives from the Treasury, the Foreign Office, the Board of Trade, and the Export Credits Guarantee Department.

E.D.A.'s 1958 Campaign

In the campaign arranged for the coming months the British Electrical Development Association is concentrating attention on water heating and cooking and is resuming the use of the national newspapers for its advertising. As a regular symbol the Association is using a drawing of a small boy which is said to represent "up-to-dateness." From mid-March to mid-July water heating will be the main theme; this will then give place to cooking. As well as five Sunday papers sixteen women's weekly and monthly journals will carry regular advertisements and it is calculated that a total circulation of nearly 44 million is involved. The Electricity Boards and many manufacturers will support the campaign. The Association (2, Savoy Hill, London, W.C.2) has prepared a folder containing particulars of the campaign, with samples of the "literature" available and details of the cost of materials (advertisement blocks being free of charge.)

The "small-boy" symbol of E.D.A.'s 1958 campaign

THREE-PHASE ELECTRIC ARC FURNACES

THE discussion of the paper entitled "Supply Voltage and Current Variations Produced by a 60 Ton Three-Phase Electric Arc Furnace," which was given at the Institution of Electrical Engineers by Messrs. B. C. Robinson and A. I. Winder on 13th February and summarised in our last issue, was opened by Mr. F. Seddon. The speaker stated that the installation of two 36 MVA arc furnaces was now contemplated and that one steel manufacturer was considering installing a 45 MVA furnace. The only limitation to the size of the furnaces at present was the maximum size of carbon electrode which could be produced. In the Sheffield area alone replacement of the existing open-hearth furnaces by arc melting furnaces would mean an additional arc furnace load of 750 to 1,000 MVA. Investigations were being made into supplying part of the reactive load requirements of future furnaces from synchronous condensers.

Mr. E. May (Birlec) said that flicker voltages, which occurred at the rate of several pulses per second, could not be eliminated by any form of mechanical position control of electrodes. Research in progress in this country and in America on the behaviour of the arc itself might in time bring about a solution. Meanwhile, power-factor correction capacitors would very considerably attenuate the flicker effect produced by surges which lasted for only one-half to one cycle. For a synchronous condenser in association with a large furnace in Belgium recently, the supply authority shared the cost with the furnace user. Certain precautions might be necessary when installing power-factor correction capacitors to two or more arc furnaces in close proximity on the same supply. Charge sharing between capacitor banks might be accompanied by large transient high-frequency currents with the possibility of damage to equipment. The h.r.c. fuses associated with the capacitors had sometimes exploded violently. Surge-limiting reactors were now often fitted.

Voltage Fluctuations

Mr. R. S. Ryburn (C.E.G.B.) referred to the repercussion of excessive voltage fluctuations on the supply systems, and pointed out that the governing factor was the minimum fault level or, in other words, the maximum reactance from the point of common connection back to the source. As the furnace size increased, that point should be made on a higher-voltage network. Although, in general, the raising of the voltage of the common point increased the capital cost of the furnace supply, it compared favourably with the cost of installing rotating plant to provide the reactive megavars. Furthermore, there was a conflict in providing by synchronous condensers a shunt path of sufficient low reactance to the intermediate busbar in order to make the provision of such plant fully effective in sharing the reactive megavars with the supply transformers. Ideally, the point of injection of the synchronous plant should be as close to the furnace as possible, and studies were being actively pursued into the effect of connecting a synchronous condenser to the tertiary winding of the arc furnace transformer.

Mr. T. B. Rolls (McLellan & Partners) said that if very large arc transformers were likely to come into being, it would be necessary to undertake a great deal of study of the pros and cons of series and shunt capacitors, synchronous condensers and combinations of both, and perhaps buffer reactors as well.

Mr. E. L. White (E.R.A.) stated that in a 30 MW calcium carbide furnace, which had much in common with the steel furnace, voltages due to switching surges on the system could reach something like 20 times the normal peak voltage to earth at the furnace. Some consideration should be given to those possible high voltages in drawing any conclusions about the insulation of the transformers.

Mr. W. G. Hawley (B.I.C.C.) suggested that consideration ought to be given to the rapidity of voltage fluctuations, which the authors showed to be insistent during the melting stages. The flicker might be unbearable and could be experienced several miles away. Advantage could possibly be taken of the self-regulating properties of series capacitors.

Mr. J. W. S. Payne (B.T.H. Co.) considered that the furnace-transformer-bus fault MVA was not always an absolute criterion of light flicker, as the nearest lighting load might be interconnected at a point corresponding to a higher supply fault MVA.

Mr. P. F. Grove (McLellan & Partners) observed that Americans had stressed the value of fast electrode control and that they were investigating static amplifier systems which might prove faster than present methods, enabling the control to follow down the charge more evenly.

Mr. Walters (E.R.A.) suggested that furnaces could be designed to behave in the early stages as they did in the later stages. Fifty per cent more might be spent on the furnace in order to get rid of fluctuations, particularly when the cost of capacitors, synchronous condensers, and so on, was considered.

Mr. J. R. Spanswick, Mr. R. G. Round, Mr. E. R. Freeman and Mr. W. L. Brown also took part in the discussion, to which Dr. B. C. Robinson briefly replied.

National Inspection Council

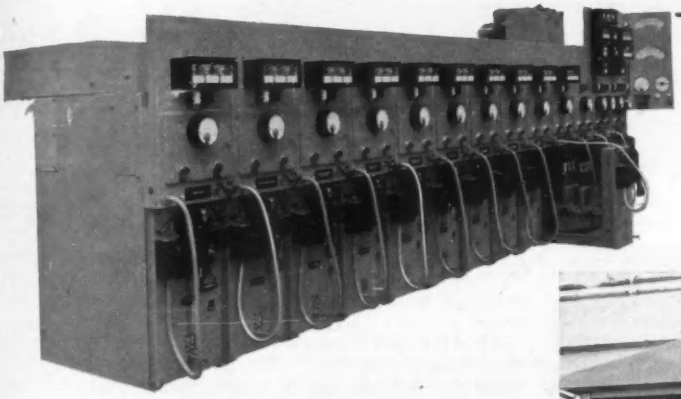
A THIRD progress report, covering the last quarter of 1957, has been prepared by the National Inspection Council for Electrical Installation Contracting. It shows that up to the end of last year 265 applications for enrolment were received of which 124 were accepted and six rejected; the remainder were still under consideration. In the last quarter of the year 900 routine inspections were carried out, making a total of 3,200 since the scheme was instituted.

Inspected contractors are classified in four categories in descending degrees of compliance with the rules. So far the results have been as follows:—Category 1, 5 per cent; Category 2, 48 per cent; Category 3, 45 per cent; and Category 4, 2 per cent. Second visits to contractors whose work was placed in Categories 3 and 4 have revealed an improvement in standards of work in practically all cases. It is estimated that altogether about 7,500 installations were inspected. Figures produced for the first complete year of operation show that over 8,000 installations by more than 3,500 approved contractors have been examined.

A second edition of the "Roll of Approved Electrical Installation Contractors" is shortly to be published. The Council's expenditure for the first nine months' operation was £35,000, with a further £900 for capital expenditure on equipment, against an estimate of £53,000 for the complete year, including £5,000 as reserve for contingencies. Fresh accommodation is being sought as the landlords of the present premises, 13, Victoria Street, London, S.W.1, wish to embark upon a rebuilding scheme.

MANUFACTURING PROGRESS IN 1957

Crompton Parkinson, Ltd.



Thirteen-panel Cooke & Ferguson switchboard for West Coast Paper Mills, India

DURING last year the production facilities of Crompton Parkinson, Ltd., have been increased by a large extension at the Chelmsford works which is providing substantially greater space for the production of both oil-break and air-break switchgear. At the Derby cable works, a large extension has been completed for the production of thermoplastic cables. The modernisation and streamlining of the complete manufacturing plant for fluorescent tubes at the Guiseley works was another notable production development, this being carried out when tube production was transferred from Doncaster to Guiseley.

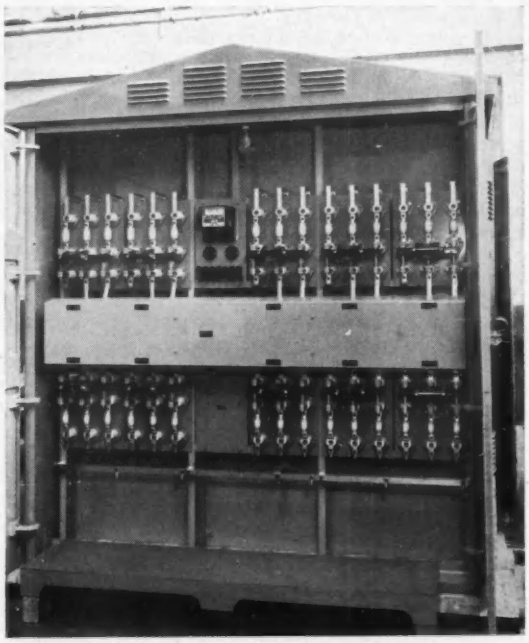
Overseas, work has been proceeding to extend the capacity at the Worli works, near Bombay, by the erection of a new factory at nearby Kanjur. At Campbelltown, New South Wales, Australia, a new factory was completed and commissioned.

Product Developments

Among rotating plant activities, the most important development was the new 1 to 50 h.p. range of Series 5 squirrel-cage, three-phase motors introduced at the beginning of 1957. These machines conform to the new B.S. 2960 : 1958, for dimensions, and to B.S. 2613 : 1957 for Class " E " insulation.

Other developments included a range of 400 c/s machines which can be offered with the special characteristics required for a variety of applications including computers, electronic and radar apparatus, and an extensive amount of aircraft equipment. Where appropriate, a waveform having low harmonic content can be provided. A new range of alternators for operation at 1,500 r.p.m., for outputs up to 2,000 kVA and with the special characteristics needed for gas turbine drive was also introduced.

The ABM range of air-break switchgear for 600 V, three-phase operation with current-carrying capacities up to 3,000 A was made available during the year. Up to 1,600 A, the circuit-breakers are housed in two tiers. An important lamp development during 1957 was the invention of a new stem fuse for general lighting service lamps of 40-200 W ratings. The new fuse has the same outer form as the older type, but the sheath is filled with about 7,000 minute glass balls. The purpose of these is instantaneously to suppress and quench any arc that might occur at the instant of fusion, and so entirely remove any possibility of lamp bursts.

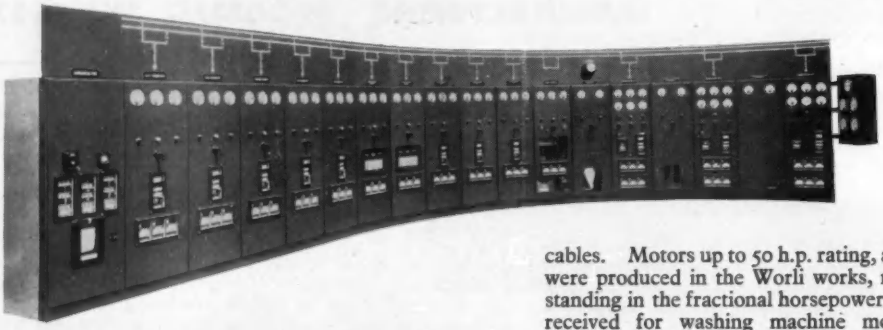


Ring main kiosk for Russia

Last year the company was favoured with many orders for a diversity of plant and equipment. At home, switchgear contracts included an order for a 33 kV substation at Aylesbury, covering outdoor type circuit-breakers complete with control and relay panels and multi-core cabling, and a 13-panel, 33 kV metalclad switchboard with control and bus-zone protection boards at Barony. Of note in connection with orders from the electricity undertakings, was the continued heavy demand for transformers, ranging from small pentagonal type rural transformers to 120 MVA supergrid units.

For a motor vehicle body-building plant, orders received for h.v. and l.v. switchgear, transformers and cable work, total £110,000 in value. At a new foundry, a seven-unit 11 kV switchboard was installed for the incoming feeds from the power house and out-feeds to the distribution rings. Four reactors were supplied to reduce the fault level at the intake point and ten substation equipments were installed in the foundry's 11 kV distribution ring. There was also a very large quantity of C.P. motors employed (auto-synchronous and induction) for compressor drives, ventilation equipment, dust extraction plant, etc.

Contracts were received for the complete electrification



Eighteen-panel control board for the 11 kV switchgear at Saurashtra, India

of a new biscuit factory, and large power distribution schemes at a tyre plant, a refrigerator factory, a film studio, and a dockside hydraulic pumping station. Also of note was an order for a comprehensive scheme to protect an oil refinery system from possible damage in the event of power supply failure, the installation consisting of an elaborate pumping unit for hot oil, the operation of which is essential if pressure is not to be built up to an extent which would burst the storage vessels. The company was responsible for the Ward-Leonard equipment for a giant lathe which is understood to be the largest in the country and, possibly, in Europe. All the machines for this latter, which has a face-plate of some 23ft diameter, are forced-draught ventilated.

Particularly noteworthy was an increase in demand for transformers having either Class "H" insulation or in some cases Pyroclor coolant. Such features were required for certain installations where risk of fire was fairly high.

Notable among overseas contracts put in hand in 1957 were those for comprehensive electrical installations at cement plants, a new tyre factory and a paper mill plant in India, and one covering complete high-voltage and low-voltage distribution systems on the islands of Comino and Gozo, adjacent to Malta. The company joined with a number of other British firms in the formation of Rustyfa, Ltd., which company will supply a complete motor tyre factory to the U.S.S.R.

Overseas Switchgear Orders

With regard to overseas switchgear business, many interesting orders were secured, both for the Chelmsford works and for the Cooke & Ferguson, Ltd., works at Manchester. The Manchester works were engaged, in particular, on the supply of outdoor and metalclad switchgear to South and Central Africa. One large export order for Cooke & Ferguson gear was that received from the Far East for 110 35 kV outdoor oil circuit-breakers. Business for the Chelmsford works included switchgear for New Zealand, Africa, the Middle East and India, one notable order from India being for a 14-unit, duplicate busbar 11 kV switchboard and control board to be intalled in Saurashtra.

There was also a steady increase in export orders for the transformer works at Hayes. An important order nearing completion is for three 90,000 kVA, 132 kV transformers for the Electricity Supply Commission of South Africa, while among many others were orders for two 50,000 kVA, 110 kV units for the Auckland Electricity Power Board and a 45,000 kVA, 69 kV unit for the State Electricity Commission, Victoria.

A contract, which involved a large number of motors, was for the electrification of the West Coast Paper Mills in India. All the motors over 50 h.p. rating were supplied from the United Kingdom, together with switchgear and cables. Motors up to 50 h.p. rating, and the transformers, were produced in the Worli works, near Bombay. Outstanding in the fractional horsepower field were the orders received for washing machine motors, one overseas customer alone calling for 30,000 machines during the year.

Among numerous orders of note for the larger types of rotating plant, one of particular interest called for a large number of self-regulating alternators for the New Zealand Posts and Telegraphs Department; these machines, of the latest pattern having direct-coupled exciters, have been specially adapted to avoid radio interference.

Despite restrictions in cable imports by members of the Commonwealth due to the expansion of indigenous manufacture, there was a substantial increase in the value of Crompton cable exports. Several new cables were introduced to overseas markets including butyl rubber types, the well-known characteristics of which ensure resistance to deterioration at high temperatures. Substantial orders for underground mains cables were received from the Singapore City Council and Uniao Electrica Portuguesa. Several orders were placed by the Saskatchewan Power Corporation in connection with the Boundary Dam generating station, and another substantial power cable order was received from Angola, Portuguese West Africa.

Equipment for British Railways

The Traction Division was given further orders during the year for equipment required by British Railways under their modernisation plan. Apart from various auxiliary equipment, the company will now supply the complete electrical equipment for 83 locomotives of 1,160/1,550 h.p. to be built by the Birmingham Railway Carriage & Wagon Co., Ltd., and for 10 locomotives of 2,300 h.p. which are being built by British Railways at Derby. The 1,160 h.p. locomotives are destined for the Eastern Region and the Scottish Region. The 1,550 h.p. locomotives, of which 45 are to be built, are for the Southern Region.

During the year, 24 cylindrical frame 70 h.p. traction motors were supplied to the Gloucester Railway Carriage & Wagon Co., Ltd., for equipping six dynamically braked cars for the Toronto Rapid Transit Subway.

A trolley locomotive of a new type for industrial use was built in Johannesburg by Hunslet Africa (Pty.) having an interesting form of transmission, whereby two 62 h.p. continuously running compound wound traction motors of the cylindrical frame type drive one into each side of a mechanical differential; the locomotive drive is taken from the differential cage. Two locomotive equipments were supplied.

Early in the year twenty sets of trolley-bus equipment were ordered by Bournemouth Corporation. These equipments differ from those last purchased by the Corporation, which were also supplied by Crompton Parkinson, in having side-mounted control gear and automatic acceleration. This order was increased later in 1957 by a further ten similar equipments.

Teachers for Technical Colleges

Minister of Education's Proposals to Local Authorities

FOLLOWING his proposals for encouraging students to become technical teachers, reported in our last issue, the Minister of Education, Mr. Geoffrey Lloyd, last week issued a circular to local education authorities on the steps to be taken to increase the number of teachers in technical colleges. An increase of 7,000 full-time and 8,000 part-time teachers is needed by 1960-61. He said the Government wished local authorities to provide more attractive conditions, better accommodation, facilities for research and for further education and refresher experience, and a closer liaison with local industry. The proposed innovations are the result of recommendations made by a special committee of experts who reported to the Minister last year.

A rapid expansion in teaching strength in the colleges is a fundamental condition of the Government's plan to increase the output of scientists, technologists, technicians and craftsmen. Looking ahead to the later 1960s, the Government expects to increase, from 10,000 to 20,000 a year, the output of scientists and technologists from the universities and the technical colleges combined. The correspondingly large increase in the output of technicians and craftsmen must come from the technical colleges in collaboration with industry.

Local education authorities are making good progress with the £100 million programme, to be put in hand by 1961, for the provision of new buildings and equipment for technical colleges in Great Britain (announced in the Government White Paper of February, 1956). Work amounting to £60 million has already been either started or approved in the building programme.

The Willis Jackson Committee estimated that the total number of full-time teachers in the colleges would have to increase by a net 1,400 in each of the five years 1957-61, with a corresponding net annual increase of 2,000 part-time teachers.

Improved Amenities

Acting on the Committee's recommendations, the Minister is now asking authorities to consider measures to make teaching more attractive to men and women in industry. The circular refers to the provision of better amenities for staff, and to the appointment of more clerical, laboratory and workshop assistants. Every effort should be made to cut down the excessive amount of teaching at present undertaken by many teachers. The Minister stresses that facilities for research should be extended. He also recommends periods of release from teaching duties, in which teachers may study for first or second degrees or for the Diploma in Technology. Teachers are also to be encouraged to return to industry for short periods to refresh their experience. They will also be given leave of absence with pay to carry out special studies or surveys, or to visit teaching institutes abroad. The Ministry believes that facilities for doing part-time consultancy work for industry will be a great help in attracting teachers of first-class quality.

At the same time the Minister stresses the view that closer relations between the colleges and industry are needed, with a view both to making it easier for staff to transfer from industry into full-time teaching, and also to securing the release of industrial staff to teach part-time in the colleges during the day. The Willis Jackson Committee emphasised the value of such part-time teachers in its report, stating that "unless employers are prepared to arrange on a greatly increased scale for their staff to teach part-time during the day in technical colleges, the colleges will find it impossible to make the educational provision which industry will require." Authorities are being urged to extend their recruitment arrangements as widely as possible, to include late entrants of various kinds, such as men from the Armed Forces and from research organisations, and married women. The Minister strongly recommends that authorities should appoint strong governing bodies for technical colleges, on which leaders of industry and commerce are chairmen or are effectively represented. As instances of this, the Minister cites the case of Sir Claude Gibb who is chairman of the Rutherford College at Newcastle, and Mr. J. J. Gracie (G.E.C.) who is chairman of the Birmingham College of Technology.

Australian Electrical News

THERE were good grounds for confidence that commercial broadcasting in Australia would hold its own against television, stated the Postmaster General, when he opened the annual convention of the Australian Federation of Commercial Stations. The convention was held at Leura, in the Blue Mountains, about 60 miles from Sydney. Strong representations continued to be made to him, Mr. Davidson said, for more commercial and national stations—a fact which indicated that the public was still very interested in broadcasting.

Electronic Industries, Ltd., of Melbourne, is planning major expansion during 1958. The company earned a group profit of £A476,000, covering the 12½ per cent dividend twice, in the record year to 30th June last. The chairman (Sir Arthur Warner) told the annual meeting of the company in Melbourne that the expansion programme included the erection of a new £A500,000 office building in South Melbourne and, later, the purchase of 86 acres at Moorabbin for a new centre for manufacturing activities.

An Australian ship has been fitted with an electronic device designed to prevent the growth of barnacles on the steel hulls of vessels. The ship is the M.V. *Manoora*, of the Adelaide Steamship Co., and the equipment has now satisfactorily passed the trial period of one year. During that time it is estimated that 236 tons of fuel was saved. The equipment, which develops supersonic sound waves in the steel hull of the ship, was supplied and installed by Amalgamated Wireless (A/asia), Ltd., and was manufactured by Marconi's, of England.

Sydney and Melbourne will probably have "phonevision" subscription television services in less than two years. A £A500,000 company has been registered in Melbourne to manufacture the electronic mechanism for the service. The company is Subscription Television, Ltd., a subsidiary of the Rola Company (Aust.) Pty., Ltd. Rola has rights to the "phonevision" system developed by the Zenith Corporation of Chicago.

Some concern is felt over the possible effects on the local electronics industry of a trade agreement, recently signed, between Japan and Australia. Mr. A. L. Bayley, president of the Electrical Manufacturers' Association of Victoria, said that, while at the moment it was not possible to obtain evidence of the competition local manufacturers would be facing from Japan, it was clear that the big difference in working hours, living conditions and mass production could bring about a serious decline in Australian employment and have a disastrous effect on the stability of the local electrical and electronics industries. Manufacturers are bringing pressure on the Australian Government to import only equipment not procurable in Australia and to frame specifications to fit Australian conditions and needs and the capacity of Australian factories.

ELECTRICAL CONTRACTORS' DINNER

POINTS FROM SPEECHES

THE annual dinner of the Electrical Contractors' Association and its allied organisations was held at Grosvenor House, London, W.1, on 11th February. The principal guest was Sir Christopher Hinton, K.B.E., F.R.S., chairman of the Central Electricity Generating Board, and the president of the Association, Mr. H. S. Wathes, was in the chair. There was a distinguished company from all branches of the industry and other walks of life.

Sir Christopher Hinton proposed the toast of the Association, saying that it was the first time he had met the electrical contractors since his appointment as chairman of the C.E.G.B. They and the Electricity Boards formed the backbone of a great and expanding industry. No industry had shown such great and continued growth as the electricity supply industry and although economists and statisticians doubted whether the expansion would continue, engineers knew that it would. In terms of real money the cost of electricity was falling and would continue to fall, assisted in the long run by nuclear power.

It would be a great mistake to consider that nuclear power was a glorious bandwagon on to which anybody could jump. It was more like a covered wagon making a difficult passage across a continent; but in the long run it must lead to reduced prices for electricity and consequently even greater use in industry and the home. But nuclear stations could be run economically only if they operated at full load for 24 hours a day. The contractors, who were in intimate contact with the consumers, were best able to persuade them to use more electrical appliances and use them more efficiently. Contractors could also help to secure greater standardisation and greater safety; they should make their Association better known to the public and thus be of even greater service.

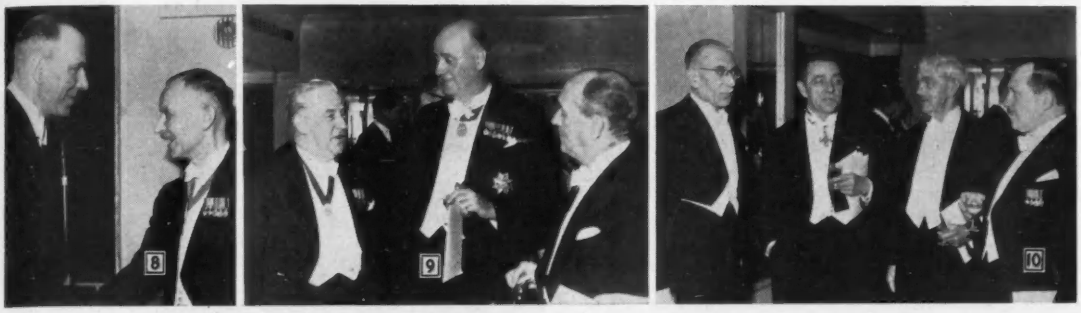
Problems Ahead

Mr. Wathes prefaced his response to the toast with a welcome to Sir Christopher and congratulations upon his appointment. He went on to say that the developments in electricity generation and distribution which had taken place since the war, and the expansion programme now in hand, were more than justified by the ever-increasing industrial and domestic demands. Contractors were fully conscious of the need to improve load factor but, speaking from personal experience, he thought that off-peak rates for storage heating were not attractive enough.

After a reference to the boundless possibilities for all engaged in the electrical industry, Mr. Wathes said that confidence in the future must not blind them to the problems lying ahead. Among other things, there was the Restrictive Trade Practices Act—a political folly, imposing added and unnecessary problems on industry

Some of the company at last week's E.C.A. dinner

1. Mr. A. F. Plummer being received by the President (Mr. H. S. Wathes). 2. Sir Christopher Hinton, Mr. L. C. Penwill (director and secretary), Mr. C. R. King and Mr. R. R. B. Brown. 3. Messrs. W. E. Babb, R. Nicholls, B. W. Pickup and P. B. Etheridge. 4. Mr. Eric Beaver and the President. 5. Messrs. C. R. King, R. R. B. Brown and N. Aish. 6. Col. B. H. Leeson and Brig. W. G. S. Thompson. 7. Messrs. R. H. M. Drake and C. C. Hyams



8. *Mr. J. P. Inglis and the President.* **9.** *Mr. S. Dickinson, Sir Henry Self and Mr. J. G. Briggs.* **10.** *Messrs. J. I. Bernard, L. C. Penwill, E. A. Reynolds and A. M. Parkinson*

and absorbing time and energy which would be far better applied to normal industrial development and the rebuilding of the country's economy.

The European Free Trade proposals would also bring their special problems, although they hoped that there would also be advantages. Manufacturers would be quick to seize on these, but they would expect to meet fresh competition at home from the importation of Continental appliances, accessories and installation materials. Electrical contractors and retailers must not permit the superficial attraction of appearance or price to lower standards of quality and safety. With this in mind they welcomed the movement now on foot for the setting-up of an Approvals Board, but the greatest care must be taken in establishing criteria by which products were to be judged. The establishment of such a Board must be accompanied by the fullest publicity.

Another step which they had taken towards the safeguarding of electricity consumers was the setting-up of the National Inspection Council. They were co-operating wholeheartedly, but that form of voluntary registration meant that they were preaching almost entirely to the converted; since its inception the Council had recruited a mere handful of contractors who were not already members of the appropriate associations. It was obvious that there were wide gaps in their defence against bad installation practice which the present organisation could not fill. While he agreed that regimentation and compulsion were abhorrent they must recognise the limitations of the present system and try to find some method of overcoming them.

Charges of irresponsibility had been made against the Association in relation to apprentice training arrangements. He refuted these absolutely; the Association was determined to play its full part in providing an adequate intake of well-trained craftsmen and technicians for their important and expanding industry.

Mr. Wathes concluded by expressing his appreciation of the friendliness towards the Association of those in other branches of the electrical industry and in other fields.

Mr. C. C. Hyams proposed the health of the guests in felicitous terms, describing Sir Christopher Hinton as a man of immense achievement. He also congratulated Mr. Leslie Gamage on becoming head of his great company.

In the course of his reply to the toast Mr. Gamage said that the Government had wisely prescribed medicine for inflation—but how unpleasant that medicine could be was now being experienced by industry. Business was slowing down but it was still going and their enthusiasm and energy were undampened. The proposed European Free Trade Area would be a great adventure. We should not approach it as though we were bound to lose. We had to enter into it or our export trade would suffer a mortal blow. All must work together and play the game according to the rules. In this respect Mr. Gamage paid a tribute to the work of the Electrical Fair Trading Council. He considered that while the Free Trade Area would involve risks they would not be greater than those we were already tackling. We were even successfully competing in Germany itself.

Any Approvals Board which might be set up would need to secure the confidence of the whole industry and of the public. In this all could play a part. Many contractors were already doing good work in overseas countries. He would like to see more British firms having a go at export; it would be excellent training for the Free Trade Area with its 250 million customers.

Mr. F. C. Braby, president, Engineering and Allied Employers' National Federation, also replied to the toast. He said that while relations between employers and employees were generally good in individual concerns, in the wider sphere politics entered into the matter. Trade union leaders usually had an eye on the next election and were thus in a difficult position. Referring to the comprehensive labour contracts which were a feature of American industry, Mr. Braby said that he did not think that such a contract could cover such a vast and varied field as was represented by our engineering industry.

The president's health was proposed by Mr. R. H. Gill, chairman of the Leicester Branch, of which Mr. Wathes is a member, and Mr. Wathes made a brief acknowledgment.

Industrial Lighting Conference

A CONFERENCE on industrial lighting organised by the Illuminating Engineering Society will be held on 1st April at the Northampton College of Advanced Technology, St. John Street, London, E.C.1. The conference is intended primarily for works managers and works engineers but is open to anyone who is concerned with production or industrial management. It will be opened by Mr. R. Bramley-Harker, H.M. Deputy Chief Inspector of Factories, after which the following lectures will be given:—"Good Lighting and its Justification," by H. Hewitt; "Light Sources and Equipment," by W. R. Stevens; "Maintenance and Economics," by W. Robinson; and "Some Recent Installations and Particular Problems," by J. G. Holmes. The E.D.A. film "New Light on Industry" will be shown and there will be a "forum" at the end of the conference.

A leaflet giving full details of the conference and a registration form may be obtained from the secretary, the Illuminating Engineering Society, 32, Victoria Street, London, S.W.1. The registration fee is £1; morning coffee, lunch and tea will be provided.

London Electricity Board Contracts

IT was announced last week that the Minister of Power, in agreement with the chairman of the London Electricity Board, had decided to have an investigation made into the Special Contracting Department of the Board arising out of reported transactions with the Maybridge Construction Co., Ltd. Messrs. Deloitte, Plender, Griffiths & Co. will undertake the inquiry.

Earlier the Board had stated that they were investigating the circumstances of the association of Mr. L. R. Perkins, head of their Contracting Department, Stratford Place, London, W.1, with the Maybridge Construction Co. Pending the completion of their investigation, Mr. Perkins had been suspended from duty.

The secretary of the Maybridge Construction Co. said last week that Mr. Perkins was the principal shareholder in the firm, which was formed last year. He said he had seen a newspaper report that the company had been granted contracts by the London Electricity Board and that trade unionists working on one of the projects—at Marchwood, Southampton—were pressing for a full inquiry.

Mr. Perkins' Statement

On 12th February Mr. Perkins issued a statement which, he said, he had made to the London Electricity Board. In this he said that the idea of forming a small private company to cope with some of the work usually undertaken for the Contracting Department by rough labour gangs was originally conceived as a result of the difficulty which was being experienced in obtaining gangs, and also of retaining the key personnel in charge of those gangs. In August last Mr. S. Bush, senior cable ganger, left the Department at very short notice, and in so doing seriously embarrassed the Department in the commissioning of the Rogerstone generating station. It was also discovered that the most useful members of the cabling gang, who had been employed on the Battersea and Acton Lane generating station jobs, were being enticed to join a competitive contractor by the offer of exceptionally good rates and conditions.

On 21st June last, Mr. J. R. Bovington, who is now managing director of the Maybridge Construction Co., but was then a senior foreman in the Department, told Mr. Perkins that he proposed to continue his services with the Board for a month or two until arrangements could be made for someone to take over his work, but that, as soon as possible, he wished to leave in order to start up a business of his own. In his letter he asked if the Department could use his services as a sub-contractor if he were to start in business.

Mr. Perkins said that he had convinced Mr. Bovington that this would not be a satisfactory way of conducting business and finally suggested to him that he (Mr. Perkins) and some of his senior colleagues would be prepared to find the capital to enable him to starting trading. As he was most anxious that none of the activities of the new company should in any way prove inimicable to those of the Board, he decided that he must have final control of the company, but no active participation in its working. To this end the Maybridge Construction Co., Ltd. (82, Brixton Hill, London, S.W.2) was incorporated on 28th August, 1957, with a share capital of £500, divided into "A" and "B" shares. The shareholders of the company were Leslie Reginald Perkins, manager, Contracting Section, 252 "A"; Frank Hazlewood, supervising engineer, 48 "B"; John Henry McCarthy, supervising engineer, 48 "B"; Walter Lindsell, supervising engineer, 48 "B"; Donald Cole, supervising engineer, 48 "B"; John Richard Bovington, 48 "B"; and Joseph Walter Woolley, retired consulting engineer, 8 "B."

Thus every shareholder of the company, with the exception of Mr. J. W. Woolley, was an employee of the Contracting Department. Mr. Perkins went on to point out that although he owned half the shares, he had the right to only one-third of the profits, if any, and of the assets on liquidation, the "A" shares having half the dividend rights of the "B" shares.

The reason why he wanted control of the company was in order to be able, if necessary, to enforce a policy which would be consistent with that of his Department. The placing of any work with the company was conditional upon its not competing in any way with the Board, or undertaking work for the Board's competitors, and this policy had been consistently followed.

It had been the policy of the company to pay a basic wage with a considerable bonus based on production, and by doing so they had been able to execute a very large amount of work with a comparatively small mobile organisation to the considerable advantage of the Board and indirectly to the Central Authority. The method of placing orders with the Maybridge Construction Co. had been by negotiation or invitation to tender. Mr. Perkins said the work obtained by the Contracting Department was gained in the face of the fiercest competition from cable manufacturers and contractors. Therefore the interests of the public were adequately safeguarded and no preference of any kind was given to the Contracting Department. Indeed every obstacle was raised to the placing of orders with the Department, even when its tenders were the lowest.

Having obtained the work in open competition, continued Mr. Perkins' statement, it was then considered that, if part of the work was difficult to undertake, it could be carried out by the Maybridge Construction Co. and at the same time show the Board a margin of profit.

When the company was originally formed, this particular point was discussed with legal advisers and their opinion was that there was nothing improper about the procedure.

Mr. Perkins said that he did not approach the Board in connection with the formation of the company, because he realised it would be extremely difficult for them to give any approval or sanction of any description, but he had had the express permission of his previous employers before vesting date to take up any directorship, if he so desired, but he had never before taken any interest of any description in any company. He did not hold shares in any other organisation, but through his professional association he was a member of the board of management of the Electrical Engineers' Exhibition, Ltd. That was a non-profit-making organisation, and he received no fees or expenses.

The total value of work carried out by the Maybridge Construction Co. for the Board from the date of incorporation to the end of January amounted to £7,749. No payments of any kind had been received by him or the other shareholders from the company.

The investigation by Messrs. Deloitte, Plender, Griffiths & Co. began on Monday last. The inquiry is expected to go on for some time.

AUTOMATIC TRAIN CONTROL

The British Transport Commission's New System

DETAILS were given last week of orders totalling over £500,000 placed by the British Transport Commission with a number of firms for automatic train control equipment comprising 2,000 sets of track apparatus and sufficient equipment and spares for fitting 2,000 steam locomotives. Supplies of track equipment received in the current year will be allocated in the following manner: (1) To extend the King's Cross to Grantham installation to York (82¾ miles); (2) To equip the main line from Euston to the north as far as Blisworth (62½ miles); (3) To equip the line between Edinburgh and Glasgow (47¼ miles). The first supplies of locomotive apparatus will be used to equip some 250 steam locomotives which work into and out of King's Cross.

An account of some of the development which has taken place so far in connection with the British Transport Commission's A.T.C. system was given in a paper presented to the Institution of Railway Signal Engineers in London on 12th February by Mr. J. H. Currey, signals and communications development engineer, British Railways Central Staff. The new system operates through a magnetic link between track and train similar to that of the Hudd system described in the *Electrical Review* of 17th January, but the permanent and electromagnet inductors on the track are now closed up together and accommodated in a housing extending over two adjacent spaces between sleepers. A protective sloping steel ramp covers two more sleeper spaces on the approach side. This track equipment is placed 200 yd before " distant " signals in areas with semaphore signals, or at a similar distance before all colour-light signals in areas where these are employed. Supplies to the electromagnets are arranged so that either 12 or 24 V is obtained at the inductor terminals.

All magnets are now mounted vertically, and although with this arrangement the volume of magnetic material is less than one-fifth of that in the Hudd longitudinal type, the magnets are appreciably more powerful, being able to operate through a 5in air gap as against 4in in the Hudd system.

When a " caution " indication is to be given, the electromagnet is not energised and a horn warning is initiated in the locomotive cab by the permanent magnet after a one-second delay. Unless cancelled by the driver, the horn continues to sound and a brake application begins after three seconds. These effects occur at semaphore " distant " signals showing " caution " and at any colour-light signal showing double yellow, single yellow or red.

If the signal is " clear " the electromagnet is energised and the armature of the locomotive receiver, which is deflected as before by the permanent magnet, is restored. The momentary making of the receiver armature contact, however, picks up a relay, which is then held over one of its own contacts and causes a bell to ring for two seconds.

Resetting of the locomotive receiver after a " caution " warning is then effected by operating a switch in the primary circuit of an impulse transformer instead of by the Hudd type of magneto-generator with plunger or lever drive. Experiments are in progress with an alternative resetting system using a small power transistor as an oscillator. Another new feature of the apparatus is the use of electrolytic capacitors for delaying release of the brake valve armature, for prolonging the bell signal, and in connection with resetting. It was stated that only one failure of capacitors had been experienced in five years of trials. Development of the locomotive receiver has led to the use of a smaller and lighter armature suitable for the rapid action required at high train speeds. Oscillograph records indicate that the maximum speed at which the system would operate may be in excess of 150 m.p.h., as a result of the greater flux density of the magnets now used.

The paper dealt only with the equipment in steam locomotives, where power is taken from a 12 V, 32 Ah " NIFE " battery. In diesel and electric locomotives the auxiliary power available will facilitate installation in some respects, but considerable modifications of the apparatus are necessary for its use in electric multiple-unit trains with air as distinct from vacuum brakes. Other problems, still being studied, would arise with the use of the equipment on third-rail electrified sections on account of the magnetic field produced by the traction current in the conductor rail.

Television Viewing Distance

IN a paper presented before the Radio and Telecommunication Section of the Institution of Electrical Engineers on 19th February, Mr. L. C. Jesty (Sylvania Thorn, Ltd.) described experiments to determine preferred viewing distance for different qualities and sizes of television picture, including 405- and 625-line monochrome television and a 405-line colour picture, all with varying bandwidths.

With the first row of the audience at 12 times the picture height away, something less than 1 Mc/s luminescence bandwidth sufficed generally. For a 405-line colour television picture with fully corrected luminescence channel of 0·75 Mc/s, the average viewing distance chosen by observers was 13·2 times the picture height. For a 2·25 Mc/s luminescence channel the choice was 7·7 times. The preferred viewing distance was consistent and repeatable, indicating that, unless some new development such as receiver picture storage improved matters, the present European monochrome standards of television were wasteful of bandwidth—50 per cent in the 405-line case.

Suggestions for using the surplus bandwidth included: increasing the apparent picture sharpness; inserting colour into the upper end of the video-frequency band, but without interleaving; increasing the number of lines—405 to 625 and 625 to 819; increasing the picture ratio from 4 to 3 to about 2 to 1; allowing the receiver manufacturers a cheap " roll-off " in the video-frequency characteristic without loss of picture sharpness.

Potentialities in receiver development were very important as being ultimately responsible for most of the capital expenditure. With present home-viewing distances it would not be too uneconomical in bandwidth to provide the higher standard of bandwidth to go with them. The paper also dealt with the use of spot wobble on the 405-line picture and two scanning innovations, viz. synchronous spot wobble and sampled synchronous spot wobble, which considerably improved picture quality.

INDUSTRIAL NEWS

Cable Makers Form New Company

Cabmak, Ltd., was registered on 7th February as a company limited by guarantee without share capital. The original number of members is 20, each being liable for £50 in the event of winding up. Its objects are to provide secretarial, managerial and other services for any trade or other association or organisation of manufacturers, etc. The subscribers are British Insulated Callender's Cables, Ltd., Norfolk House, Norfolk Street, W.C.2; Enfield Cables, Ltd., Brimsdown, Enfield, Middx.; Greengate & Irwell Rubber Co., Ltd., Greengate Works, Salford; W. T. Henley's Telegraph Works Co., Ltd., 51-53, Hatton Garden, E.C.1; Johnson & Phillips, Ltd., Columbia House, Aldwych, W.C.2; Pirelli-General Cable Works, Ltd., 343-345, Euston Road, N.W.1; and Siemens Edison Swan, Ltd., 155, Charing Cross Road, W.C.2. The management is vested in a Council, the first members of which are: F. Waine, 67, Ennismore Gardens, S.W.7, chairman, B.I. Pension Trust, Ltd.; E. J. Vidler, H31, Du Cane Court, S.W.17, director of W. T. Henley's Telegraph Works, Ltd., etc.; W. L. Smith, director of Oriental Tube Co., Ltd.; and R. W. C. Reeves, director of the Belmos Co., Ltd., etc. Secretary: A. H. Carmichael. Registered office: Dickens House, 15, Took's Court, Chancery Lane, W.C.2.

[We are informed by the Cable Makers' Association that this company has been formed for purely internal administrative purposes. — Editors, *Electrical Review*.]

Applications of Polyethylene

A preview of a colour film, "People and Plastics—Polyethylene," was held in London last week. The film, made by Bakelite, Ltd., is intended for the general public and shows the uses of polyethylene. The production of polyethylene film and the more important applications of the sheet form are shown as well as the uses of polyethylene for packaging. The production of piping from the small diameter for use in ball-point pens to large pipes for industrial purposes is shown and the ease of laying a water main is illustrated.

Polyethylene is ideally suited for electrical insulation. It has a high resistivity, low permittivity, and a low power factor. It is light, tough, resilient and resistant to most chemicals and is, therefore, widely used for cable insulation. The manufacture of a submarine telephone cable is shown. Television aerial down leads using a cellular polyethylene which has a lower dielectric constant than that of solid polyethylene are also mentioned.

Japanese Visit Berkeley

The president of the Japanese Atomic Power Co., Mr. Yasukawa, and seventeen members of the company, including Mr. Ipponmatsu, visited Berkeley nuclear power station on 12th February. During their tour they saw the turbine hall and both reactors and were shown the A.E.I.-John Thompson Nuclear Energy Co.'s method of constructing the reactors from the beginning *in situ*.

Guided Missiles Window Display

One of the current window displays by the General Electric Co., Ltd., at Magnet House, Kingsway, London, W.C.2, shows some of the company's work in missile-guidance development. The window is backed by a colour impression of the Armstrong Whitworth ship-to-air "Seaslug" in action, and shows waveguide circuits for microwave signals, experimental transistor guidance equipment and models of an experimental homing head and of the G.E.C. "Stardac" analogue computer. The company is responsible for guidance equipment for the "Seaslug."

G.E.C. guided missiles display

Tribute to Westinghouse

The Westinghouse Electric International Co. informs us that a bust of the company's founder, George Westinghouse, was recently placed in the Hall of Fame for Great Americans, at New York University, when Mr. Herbert Hoover, a former President of the United States, paid a tribute to the great inventor. Apart from the air brake bearing his name, George Westinghouse was responsible for many other major developments, including the practical use of alternating current for lighting in 1886 from generators installed at Niagara Falls, New York. His work extended to this country, as well as others, and his companies were among the earliest in the British electrical industry.

Lamp Price Reductions

Reductions in the prices of coiled coil clear and pearl lamps have been announced by the A.E.I. Lamp & Lighting Co., Ltd., the General Electric Co., Ltd., Atlas Lighting, Ltd., and Ekco-Ensign Electric, Ltd. In each case the new prices are as follows:—40 W and 60 W lamps, 1s 9d (including 3½d purchase tax); 75 W and 100 W lamps, 2s 4d (including 5d purchase tax).

Refrigerator Wall Chart

The Technical Sales Promotion Department of the Hotpoint Electric Appliance Co., Ltd., has issued a useful wall chart showing diagrammatically the basic principle of the hermetically sealed system installed in its domestic refrigerators. Clearly printed on 19in × 12in card, with key colours in red and blue showing the passage of the refrigerant through the system, with its successive changes, the chart, which is protectively varnished, provides a visual aid in explaining in non-technical terms the way the refrigerator operates. A cutaway view of the compressor unit with its starting relay exposed shows simply the relationship of the electrical and mechanical components. Copies of the chart may be obtained free and post free from the company at Peterborough.

Queensland Development Mission's Visit

The Commercial Relations and Exports Department of the Board of Trade announces that the Queensland Government is sending a mission to London to draw attention to its plans

for development and to explore the prospects for local manufacture of United Kingdom goods. The mission will study development areas in the United Kingdom with a view to introducing, if appropriate, similar facilities for industry in Queensland. It will be headed by Mr. K. J. Morris, M.L.A., Deputy Premier of Queensland and Minister for Labour and Industry. The other members will include the Federal President of the Associated Chambers of Commerce of Australia and the president of the United Graziers' Association, together with industrial and banking representatives.

The mission will be in London from 8th April and will arrange visits over approximately four weeks following that date to various industrial centres in the United Kingdom. Any firms or organisations wishing to meet the mission should write to the Agent-General for Queensland, Strand, London, W.C.2, suggesting when a visit by the mission might be arranged.

Designs of the Year

Following the successful precedent in 1957, the Council of Industrial Design announces that the "Designs of the Year" awards are to become an annual event. The announcement of the chosen products and their display in the Design Centre will take place on 8th May next when the Duke of Edinburgh will again visit the Centre and present certificates to the manufacturers and designers of the twenty products.

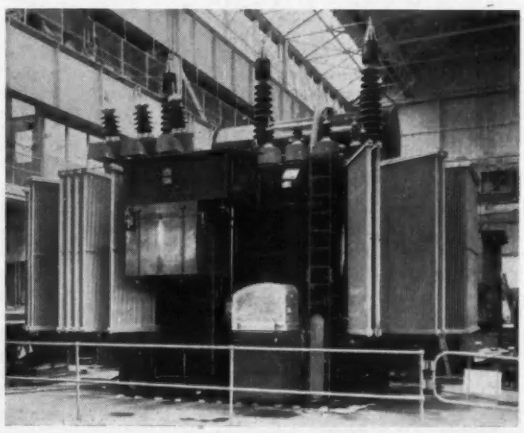
The selection panel appointed by the Council of Industrial Design has this year recommended that twenty outstanding designs be chosen, as against twelve last year, in order to widen the coverage of industries and prices. Only goods actually exhibited in the Design Centre during the calendar year 1957 will be eligible.

Switchgear Company's "Coming-of-Age"

Contactor Switchgear, Ltd., recently celebrated the 21st anniversary of its foundation. To mark the event it has issued a well-produced and profusely illustrated brochure showing industrial plants in which its equipment has been installed. Mr. H. Rayner (chairman), in a foreword, says that the company was formed with the intention of meeting a growing demand for automatic electric control gear. In order to provide a novel approach to the market, a licence was acquired to manufacture gear to the design of La Télémécanique Electrique of Nanterre, France, which was, in the main, a bar mounted construction. Mr. Rayner refers to the company's war effort and its contribution to the export drive. The company, which started with a personnel of eight, has now 585.

Transformers for Canada

Two large high-voltage transformers manufactured for the Hydro-Electric Power Commission of Ontario recently left the Walthamstow works of Fuller Electric, Ltd. — a Brush company in the Hawker - Siddeley Group—on their way to Canada, where they are now being installed. The transformers were designed and built in accordance with Canadian standards, and are rated at 25/41·6 MVA, three-phase, 60 c/s, and have a ratio of 230/46 kV with a 13·8 kV tertiary winding. Both units were fully tested at Walthamstow in accordance with Canadian standards, one transformer having impulse tests carried out on all windings by means of a two million volt impulse generator. Early delivery was an important point in obtaining this order, and the transformers were designed and manufactured in eleven months.



One of the transformers made by Fuller Electric, Ltd., for the Hydro-Electric Power Commission of Ontario

British Electronics Exports

A group of British companies has formed the Electronics Components Centre (Great Britain), Ltd., with a view to promoting British exports to Europe of electronic products by representation at trade fairs. The members of the group are Ardente Acoustic Laboratories, Ltd.; George Bray & Co., Ltd.; the British Electric Resistance Co., Ltd.; Cosmocord, Ltd.; Gresham Transformers, Ltd.; Painton & Co., Ltd.; Pena Industries, Ltd.; and Peto-Scott Electrical Instruments, Ltd. The group has contracted on a twelve-year basis to exhibit a wide variety of electronic products under the banner "British Electronics Centre." The first fair at which the group will exhibit will be at Hanover in April.

Marryats in East Africa

Marryats East Africa, Ltd., has been formed and has commenced operations in Nairobi with the installation of Marryat-Scott lifts in the new Embakasi Airport. The company is one of the Marryat & Scott Holdings, Ltd., group and has been formed to carry out the installation and service of the lifts manufactured by Marryat & Scott, Ltd., and the electrical installation work of Marryat & Place, Ltd., in East Africa. Marryats is an East African company incorporated in Kenya, with a resident staff of European engineers and supervisors.

Electricity and the Dairy Farmer

The advantages of using electricity for grain and grass drying and for providing steam and hot water in the dairy are shown in the display organised jointly by the Electrical Development Association and the South of Scotland Electricity Board at the Scottish Dairy Show being held this week at Kelvin Hall, Glasgow. The section of the display devoted to green crop conservation and utilisation shows by means of full-scale layouts the different methods of electrical drying, including the drying of grain in sack and also grass, loose or in bale, by the tunnel and platform methods; and cold air hay drying.

Samples of green crop from a number of farms, which has been dried by electricity, are displayed for examination, while display material gives actual running costs of typical plants. Another section of the stand contains a selection of electrical appliances for steam sterilising and for providing hot water in the dairy. Attention is also drawn to the saving effected by the processing of home-grown cereals and the farm mixing of stock rations by electrically-powered crushers, hammer mills and mixers.

New E.A.W. Branch

The Pontypridd E.A.W. Branch is the tenth to be formed in South Wales. The inaugural meeting was held on 10th February, under the chairmanship of Mrs. M. Higgins, M.B.E., J.P. The guest speaker was Miss Mary George, M.B.E. (E.A.W. Director), and a talk on the work of the Electricity Board and the E.A.W. was given by Mr. C. L. Townsend, sub-area manager. The hon. secretary is Mrs. D. Thomas and the hon. treasurer Mrs. Plowman.

Batteries for Tilbury Power Station

For the new generating station at Tilbury, Essex, Pritchett & Gold and E.P.S. Co., Ltd., has supplied the Eastern Division of the Central Electricity Generating Board with four stationary batteries which will be used to supply emergency current for essential services in the event of a mains failure. The two largest

batteries are 240 V installations of 400 Ah capacity at the 10-hour rate. Consisting of 120 P. & G. open-top cells, these batteries have been supplied complete with charging and distribution equipment. Their duties include emergency lighting, switchgear operation and indication, and powering emergency oil pumps on the turbo-generators. Apart from h.v. switchgear operation, the batteries are also required to feed 3·3 kV and 415 V switchgear. A 50 V battery of 24 P. & G. open-top cells with a capacity of 250 Ah at the 10-hour rate provides protection for the telephone system and a 110 V installation—55 open-top cells also of 250 Ah capacity—meets further switchgear duties.

E.P.E.A. Southern Meter Engineers' Dinner

The annual dinner of the Southern Meter Engineers' Technical Group of the Electrical Power Engineers' Association will be held on 18th April (6 for 6.45 p.m.) at Palmerston Restaurant, 49, Bishopsgate, London, E.C.2. Tickets (£1 2s 6d each) are obtainable from Mr. O. G. Davis, hon. group secretary, London Electricity Board, 131, Salisbury Road, Willesden, N.W.6.

Price Reductions

In our issue of 7th February we reported that the price of the Sunbeam frypan-cooker and the glass and metal covers had been reduced. The reduction, however, applies only to the frypan-cooker and not to the covers. The new retail price of both glass and metal covers is 25s (former prices: glass covers 23s 4d; metal covers 25s).

Siemens Edison Swan, Ltd., announces that, consequent upon improved production facilities, etc., retail prices for most of the popular "Siemax" radio batteries are being reduced with effect to the trade on and after 20th February, and to the public as from 10th March.

Electronic Company's Silver Jubilee

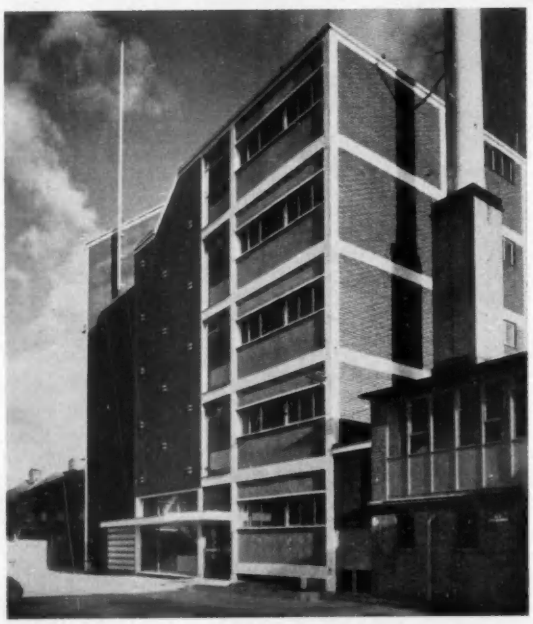
The January / February "News Letter" issued by Redifon, Ltd., celebrates twenty-five years of the company's activities in the production of a wide range of electronic equipment, including a great deal of air navigation apparatus, e.g., air-to-ground beacons, flight simulators, etc. A number of photographs are reproduced, including views of the Wandsworth and Crawley factories and portraits of the chairman, Mr. Paul Adorian, and leading members of the company's staff.

Scientific Instrument Team to Visit Canada

Following the visit of the Canadian Trade Mission to this country last December, the Scientific Instrument Manufacturers' Association is arranging a Canadian tour of senior executives of leading British instrument manufacturers. Joining in Toronto in mid-March, the S.I.M.A. eight-man team aims to extend the goodwill created during the recent visit and investigate increasing trade in instruments between the United Kingdom and Canada. The team has the active support of the Dollar Exports Council.

R. B. Pullin Extensions

The new multi-storey, 70,000 sq ft air-conditioned and temperature-controlled factory block addition to the Phœnix Works, Brentford, of R. B. Pullin & Co., Ltd., is a good example of modern factory design. The building, designed to suit the company's gyroscope, electrical and electronic precision instrument production, is air-conditioned by a system in which the whole of the circulation ducts are within a specially - designed reinforced concrete hollow column frame and are not visible either in or outside the building. Another feature of design is the ring main electrical busbar system whereby 500 kW copper busbars are carried up two vertical service ducts—one at each end of the building. These are linked at each floor level by horizontal busbars carried within suspended ceilings over central circulating corridors. Each section can be isolated and controlled by main switchgear housed in the vertical ducts. These ducts also carry heating, gas, water, airlines and high/low voltage supplies and thus the building interior is free from dust-collecting pipes and ledges. The importance of lighting has been recognised by installing a system of "graded" artificial lighting to ensure even illumination under varying conditions. The building comprises lower and upper ground floors and a further four floors all served by automatic combined passenger/goods and goods lifts.



The new factory block of R. B. Pullin & Co., Ltd., at Brentford

Television Society's Exhibition

The annual exhibition of the Television Society will be held from 4th to 6th March at the Royal Hotel, Woburn Place, London, W.C.1. The exhibits will include colour television receivers. Admission is by ticket only, available, free of charge, from the secretary of the Society, 166, Shaftesbury Avenue, London, W.C.2.

Tyneside Engineering Apprenticeships

A report submitted to the Northern Regional Board for Industry states that last year more boys wanted to enter the engineering industry on Tyneside than could be accepted. While 26 per cent of the boys leaving school wished to become engineering apprentices, the industry could only accommodate 16 per cent. Twenty-four per cent of the school-leavers were placed in unskilled or "dead end" jobs.

Holiday Announcements

Lindsay & Williams, Ltd., Openshaw Bridge Works, Manchester, 11, announces that their works will be closed from 24th May to 2nd June inclusive; a skeleton clerical and warehouse staff will be in attendance.

Indian Standards Institution

The headquarters of the Indian Standards Institution are now at "Manak Bhavan," 9, Mathura Road, New Delhi-1.

Institute of Metal Finishing

The annual conference of the Institute of Metal Finishing will be held from 15th to 19th April at the Palace Hotel, Torquay. Full particulars and application forms can be obtained from the conference secretary, 32, Great Ormond Street, London, W.C.1; applications are returnable by 1st April.

Battery Vehicles for Selfridges

For many years, Selfridges, of London, have used a fleet of battery-electric vehicles for local delivery work. Sunbeam Vehicles, Ltd., supplied a number of these to Selfridges in 1937-38 and all were fitted with B.T.H.

One of the N.C.B. battery-electric vehicles supplied to Selfridges

motors and control equipment. After twenty years of service, these vehicles are now being replaced by Smith's N.C.B. electrics manufactured by Smith's Delivery Vehicles, Ltd., Newcastle-upon-Tyne, with bodies by Glover, Webb & Liversedge, and equipped with B.T.H. motors and control gear.

Trade Announcements

Following the introduction of new lines, including "Paramount" convector heaters, **A. D. Davidson Electric Co.**, 62, Granville Street, Birmingham, has appointed A. Caldwell Young & Son, 200, St. Vincent Street, Glasgow, C.2, as its agents for Scotland. The company has also appointed R. Taylor & Co., 31, Franklin Street, Belfast, as its agents for Northern Ireland.

Mr. J. Parkyn has joined the staff of the Exeter branch of **Berry's Electric Ltd.**, as a representative.

Mr. G. E. Whalley, formerly of Astral Switchgear, Ltd., has been appointed technical representative of **Peppers of Woking, Ltd.**, who are now in full production at their new main factory at Camberley, and also at Woking.

Mr. W. H. Vance has been appointed technical sales representative of the **British Central Electrical Co., Ltd.**, and will be based on the company's west country depot at Yeovil. He has relinquished his appointment as manager of Dickes of Sherborne in order to join B.C.E. He was previously sales representative with Simpson, Baker & Co., Ltd., Exeter.

The **Midland Electric Manufacturing Co., Ltd.**, has moved its London showrooms and stores to larger premises at 238, Waterloo Road, London, S.E.1 (telephone: Waterloo 7441).

J. B. Electric, Ltd., Manchester Road, Broadheath, Altrincham, Cheshire, announce that they have purchased the business formerly owned by the Oldfield Engineering Co., Ltd., Ordsal Lane, Salford, 5. This has now been re-formed as Oldfield Electrical Repairs and will continue to handle transformer and motor repairs and rewinds.

New Transistor Factory

THE construction of the transistor factory for Semiconductors, Ltd., at Swindon has been completed and key production equipment, valued at over £100,000, recently arrived by air from America. The factory has been constructed at a cost of £300,000. Formed only in May last year by the Plessey Co., Ltd., and the Philco Corporation in America, Semiconductors, Ltd., will manufacture a wide range of silicon and germanium high frequency transistors, in their entirety, for the first time in this country, and such rapid progress has been made that the factory will be in production by the middle of this year.

During the past nine months logistic problems have been overcome, key personnel have been engaged and trained in the Philco transistor factory in America and a 40,000 sq ft factory, the construction of which started only six months ago, has been completed by the main contractors, Richard Costain, Ltd. The factory is specially insulated and has an air conditioning plant which controls the ambient temperature to ±2 deg F and humidity to ±5 per cent and by electrostatic and mechanical filtration controls ambient dust to less than one cubic micron per centimetre of air.

Facilities are provided in the factory for supplying extremely pure water of 18 million ohms/centimetre resistivity. Ultra-pure gases are piped through the plant and are available at strategically located points. To control dust, the assembly area is free from overhead piping, all services being brought up through the floor. All internal surfaces of the assembly area are designed to be smooth and non-dust-catching. Thirteen separate air conditioning units are set up so that separate zones can be controlled and maintained and sufficient flexibility is provided in the plant so that the latest developments and techniques can be incorporated as they come along with the minimum of disruption. The air conditioning, mechanical and electrical services and plumbing were by Matthew Hall & Co., Ltd.

The electro-chemical techniques developed in the United States by Philco will be employed in the manufacture, providing, in addition to automatic control and transfer methods, a close control of tolerances and purity. Among the production equipment which has been flown in from America is a pull furnace in which the silicon or germanium crystals are grown; an automatic wafer and blank scriber; a roller thickness gauge which automatically feeds and sorts the blanks into 1-10,000th of an inch gradations; a complete surface barrier transistor production line incorporating rough etcher, precision etcher and plater, all with automatic transfer; and an automatic whisker plater-attacher.

Production will begin in mid-1958 with germanium surface barrier transistors for r.f. and video amplifiers and switching circuits requiring cut-off frequencies in the range 30-90 Mc/s; micro-alloy switching and video amplifier transistors to operate up to 40 Mc/s; micro-alloy diffused transistors for v.h.f. oscillators up to 500 Mc/s, amplifiers up to 200 Mc/s and for high speed switching circuits requiring rise and fall times of a few millimicro-seconds. The range will also include types for r.f. and video amplifiers up to 10 Mc/s, and for high speed switching up to 5 Mc/s. Later this year a silicon surface alloy transistor will be made specifically for requirements involving high temperature operation.

One of the bays of the new factory at Swindon of Semiconductors, Ltd.

NEW ELECTRICAL EQUIPMENT

Multiplier Phototube

The multiplier phototube RCA-7029 is a small, sturdy, dormer-window type intended for use in the detection of low-level light signals in the presence of relatively high background illumination. Especially suited for low-contrast applications, it is obtainable from R.C.A. GREAT BRITAIN, LTD., Lincoln Way, Windmill Road, Sunbury-on-Thames, Middlesex.

Outstanding features are its median cathode luminous sensitivity of 125 μA per lumen and its stabilised sensitivity. Light is directed on to a semi-transparent photo-cathode mounted on the inner spherical surface of the end of the bulb and 10 electrostatically focused multiplying (dynode) stages having stabilised secondary-emission characteristics. The spectral response covers the range from about 2,900 to 6,200 angströms. Maximum response occurs at approximately 4,900 angströms.

Industrial Heaters

An addition to their range of industrial radiant space heaters has been announced by SIEMENS EDISON SWAN, LTD., 38-39, Upper Thames Street, London, E.C.4. It is a 1·5 kW model which has been created to permit this class of heater to be used where low ceilings (9ft to 12ft) exist or where less intense heat is required. It uses the same type of aluminium reflector as the larger 3 kW model and suspension is by means of 1in conduit which can be bent if the reflector is required to be at an angle. Both designs have waterproof terminal boxes and are suitable for outdoor use. The respective prices are £9 16s 6d (1·5 kW) and £10 17s 6d (3 kW).

Battery Electric Tractor

The new model "TOER" battery electric tractor, a recent development of LANSING BAGNALL, LTD., Kingsclere Road, Basingstoke, Hants., incorporates independent four-wheel suspension which enables it to work over uneven ground when necessary. Its 24 V 627 Ah battery provides sufficient reserve of power to ensure continuous work for a normal shift. The tractive effort is provided by a 9 h.p. compound wound heavy motor.

The tractor incorporates a built-in charger so that at the end of a shift it can be driven up to some convenient mains point for charging. The Lansing Bagnall regenerative/rheostatic braking system is employed. On decelerating, or braking, or descending an incline, the features of this system cause the motor to act as a generator and whilst controlling speed it also feeds power back into the battery.

Gouging and Piercing Electrodes

An electrode designed for cutting grooves, gouging, piercing or removing surplus metal from cast iron, non-ferrous metals and all steels has been introduced by the ENGLISH ELECTRIC CO., LTD., Clayton-le-Moors, Accrington. The electrodes, known as "Groovees," can be used with ordinary a.c. or d.c. welding plant. They leave a clean, scale-free surface and, as the electrodes contain a steel wire core, there is no chance of carbon pick-up.

For cutting grooves, the electrode is held at an angle to the work surface, pointing in the direction of travel. After an arc is struck, the electrode is moved rapidly along the line to be gouged. The force of the arc cuts the groove and removes the molten metal, giving a clean, bright finish. When piercing holes or removing rivets, the electrode is held perpendicular to the workpiece, the arc is struck and held until the metal flows, and then the electrode is moved into the molten pool. With manipulation, holes up to ¾in diameter can be pierced in plate up to ½in thick, and rivets removed from much thicker plate. "Groovees" are supplied in two standard sizes, 10 s.w.g. and 8 s.w.g.

Electric Lawn Mowers

Details of their 1958 programme of electric lawn mowers have been announced by H. C. WEBB & CO., LTD., Tame Road, Witton, Birmingham, 6. The range has been simplified by manufacturing the lawn mowers to a single specification applying to two cutting sizes, 12in and 14in, the ratings of the motors being ¼ h.p. and ½ h.p. respectively. Another model can be supplied with a 110 V capacitor-start motor and transformer and special heavy duty cable.

The company is also marketing as an accessory the "Handypoint" cable reel. This provides a portable electric point wherever it is required with absolute safety, and its winding handle rewinds the cable after use without kinking or knotting. It is fitted with a 15 A three-pin flush socket and will accommodate up to 200ft of heavy duty cable. The price of the cable reel is £3 5s.

Battery Charger

A new battery charging device, the "Davenset" automatic starter-charger, has recently been developed by PARTRIDGE WILSON & CO., LTD., Davenset Electrical Works, Evington Valley Road, Leicester. Completely mobile, it will rapid charge, engine start, and normal charge safely and simply. The rapid charging rate for a 6 V battery is 80 A and for 12 V, 50 A. Normal charging rate for five 12 V batteries (or equivalent) is 10 A; for engine starting on 6 V systems the output is 200 A and for 12 V, 150 A.

It does not rely on any ancillary devices to safeguard the battery, or to terminate the charge, and it applies a high initial current to a discharged

Left: Lansing Bagnall "TOER" battery electric tractor

Left: Webb electric lawn mower

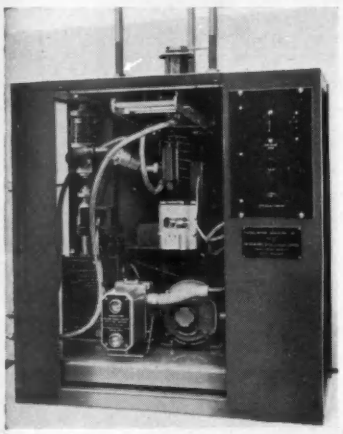
Right: Partridge Wilson "Davenset" starter charger

battery which reduces to a mere trickle charge at the completion of the charging cycle. The battery is protected by an electro-mechanical device working on the constant voltage system, similar to the voltage regulator in common use on motor vehicles. Thus the battery takes only the amount of charge it requires.

The complete unit has a height of 42in (32in to top of lid) and measures 15½ in sq. The total weight is 109 lb and the price is £58. The distribution panel is £3 extra.

C.R. Tube Re-pumping

A self-contained vacuum pumping unit for reconditioning cathode ray tubes is announced by EDWARDS HIGH VACUUM, LTD., Manor Royal, Crawley, Sussex. The unit consists of a "Speedivac" 1S50 rotary vacuum pump displacing approximately 1·7 cu ft per minute, backing a type 203 oil diffusion pump capable of attaining a final vacuum of 5×10^{-6} mm Hg. A magnetic isolation valve is mounted above the rotary pump to isolate this from the rest of the system, thus enabling the system to be left under vacuum when the unit is switched off. Other safety switches and non-return valves are supplied for the complete protection of the plant in the event of power failure.



Edwards cathode ray tube vacuum pumping unit

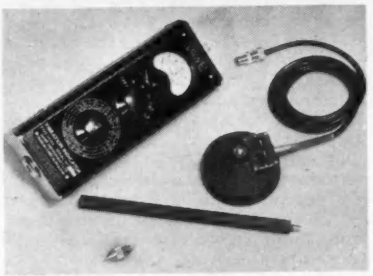
The top surface of the cabinet is made from heat resistant material and the neck gripper of the cathode ray tube is water-cooled so that the tube may be baked in an oven before sealing. The complete plant is entirely self-contained and occupies a floor space of approximately 16in by 28in, the cabinet being 30in high. The price of the unit, ready for operation, is £380.

Vibration Measurement

The self-contained Type 1414 vibration indicator made by DAWE INSTRUMENTS, LTD., 99, Uxbridge Road, London, W.5, is used with a vibration pick-up of the inertia-operated crystal type delivering a voltage proportional to the acceleration of the object with which it is in contact.

The instrument itself, measuring overall 8¾in by 3⅜in by 2⅞in and weighing 2½ lb, consists of a variable resistive attenuator (providing six ranges) followed by a high-gain amplifier feeding a direct-reading indicating meter. The meter gives a reading of peak acceleration up to the maximum valuue of 3,800/sec per sec (about 10g).

To measure the other two important characteristics of vibration, namely velocity and displacement, single- and double-integrating circuits are provided. By turning a selector knob, one or both of these integrating networks are inserted into the circuit before the amplifier, thus appropriately modifying the signal to the indicating meter.



Pocket-size Dawe vibration indicator

One application of the instrument is to check dynamic balance and the state of bearings on heavy electrical machinery.

Electric Clocks

Nearly seventy new models, hand wound and "Sectric," are included in the 1958 clock range now on display at the Great Portland Street, London, W.1, showrooms of SMITHS CLOCKS & WATCHES, LTD. Among the exhibits is the latest "Marsbrook" mantel clock in a eucalyptus and mahogany finished case. It has black Roman numerals on a spun brass zone and the polished brass bezel measures 5in in diameter. The price of the "Sectric" version of this clock is £4 19s 6d.

The latest alarm clock is the "Belcroft" in a black and polished brass case. It has gilt figures on a white background with decorative centre. The price of this model is £3 7s 6d.

Smiths Sectric "Belcroft" alarm clock (left) and "Marsbrook" mantel clock

Humidity Control Units

Two new humidity control units of Continental origin are now available in this country from HEATHER FILTERS, LTD., 28, St. James Street, London, S.W.1. They are the "Humexair," for dehumidification, and the "Satomair," for humidification, and both are being marketed in a range of three models.

The "Humexair," type SL-50, achieves an average hourly moisture extraction of over 2 pt. It is fitted with a ½ h.p. hermetically sealed motor-compressor and a removable water tank for use without a permanent drainage system. An automatic device switches off the unit after giving optical warning when the tank's water-level approaches maximum. An automatic defroster is incorporated. The gross weight is 330 lb and it measures 29in by 18in by 36in. It is a floor standing model, mounted on swivelled castors, and is suitable for operation on 220/240 V.

The "Satomair," model 30, is also completely self-contained. It is designed for installation in high-ceilinged buildings and is installed simply by suspension from the ceiling and connection to the water and electricity supply mains. Two motors, each with a rating of 130 W, are used in the unit. It is suitable for water pressures up to 70 lb/sq in and the water flow is automatically regulated by an adjustable brass float-valve in the tank. The unit can also be used as a fan, without providing humidification. Operation is on either 110 or 200/250 V, 50 c/s. It measures 29in long by 18in wide by 27½in high and the weight is 64 lb. The rate of evaporation is between 1·4 and 2·4 gal/hr.

Processing Projector

A rapid processing photographic projector produced by KELVIN & HUGHES (AVIATION), LTD., Kelvin

Kelvin & Hughes rapid processing photographic projector

Works, Winchester Road, Basingstoke, solves the problems of recording and large scale projection of cathode ray tube displays. A photographic record is made of the c.r.t. face; this is then developed by the equipment and projected on to a large screen. The processing cycle can take as little as 6 seconds and the film will then keep indefinitely. Films and processing solutions have been designed specifically for the equipment by Ilford, Ltd.

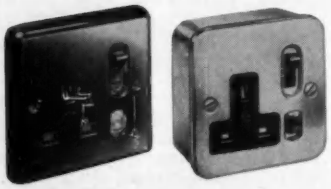
Switchsocket-Outlets

A new range of flush or surface type 13 A switchsocket-outlets, fitted with neon pilot lamps, is now obtainable from M.K. ELECTRIC, LTD., Wakefield Street, Edmonton, N.18.

The flush units have 2⅜in fixing centres and fit into the standard B.S. 1363 box. The plate dimensions are identical with M.K. 13 A one-gang flush socket-outlets and switchsocket-outlets. They are available in all-insulated or brass plate patterns, the former finished in brown or ivory, the latter in BMA or matt chrome.

Surface metalclad patterns are available either as industrial units with steel cover plates finished in aluminium stoved enamel, or as domestic units with brass cover plates finished in BMA or matt chrome.

A resistance is fitted in the lead to the lamp and spare lamps complete



M.K. Electric flush and surface pattern 13 A switchsocket-outlets with pilot lamps

with clip-in leads are available if required. The prices range from £1 3s for the surface metalclad pattern finished in matt chrome to 14s for the all-insulated flush pattern in brown.

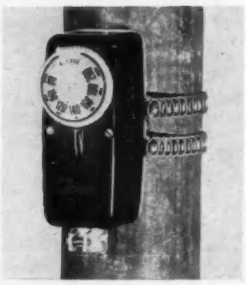
Electronic Gauge

An electronic comparator of high magnification and accuracy, the "Magna Gauge," has been introduced by SOUTHERN INSTRUMENTS, Industrial Division, Frimley Road, Camberley, Surrey. It consists of two parts: a probe unit which is brought into contact with the work, and an amplifier unit which displays the magnified movement. Displacement of the probe tip causes minute electrical changes which are transmitted to the amplifier unit; these changes are amplified and move a pointer over a scale.

By mounting the probe on a suitable stand, comparator measurements can be made to an accuracy of 0·00001in. With the probe mounted on a machine, work size can be controlled to the same limit. Electrical outputs are available for operating other devices. A signal light indicator attachment is available to indicate tolerance limits.

Clip-on Thermostat

A thermostat which can be clipped on to pipes up to 4in in diameter is announced by the DANFOSS MANUFACTURING CO., 13, Queensway, London, W.2. To obtain good thermal conductivity, copper paste is applied between the back plate of the thermostat and the pipe. The change-over contacts have a breaking capacity of 6 A a.c.



Danfoss "AT" clip-on thermostat

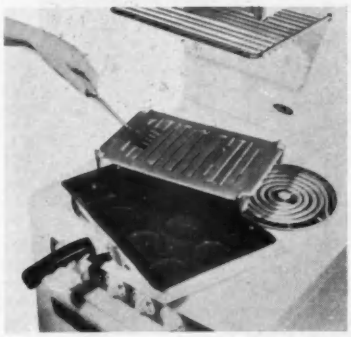
NEW G.E.C. COOKER

A COMPLETELY new electric cooker, the "Supreme," has just been introduced by the GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, London, W.C.2. It differs from any other type that the G.E.C. has previously manufactured in that it has an eye-level grill and provision for four hotplates on the hob.

The grill is situated at the top of the splash-plate. It is claimed to have 50 per cent more effective grilling area than the grill boiler and measures 12¾in in wide by 8¾in deep. The loading is 2 kW. The vitreous enamelled grill pan has a dimpled base, for the cooking of eggs, and is provided with a heat-resisting moulded handle. Within the pan is a louvred steel grid which prevents fat which may have dropped through into the pan from splashing and burning on the grill elements.

Both three-plate (DC120) and four-plate (DC124) models are available, the former being fitted with two 8in (2,350 W each) and one 6¼in (1,300 W) "Superspeed" radiant plates. An extra 6¼in plate is fitted to the four-plate model. All plates are "Simmerstat" controlled. The hob itself is hinged and there is a withdrawable drip-tray below the hob.

Right: G.E.C. "Supreme" electric cooker and (below) close-up view of the eye-level grill and its attachments



Immediately below the hob are the switches, on a recessed panel which is obtainable in blue, red or green. This panel can be changed at any time to blend with the kitchen colour scheme. The large thermostatically controlled oven (approximately 3,400 cu in) is supplied with three non-tilt reversible grid shelves and a roasting pan. It is 13¼in high by 16½in wide by 15½in deep, and has a total loading of 3,395 W. The elements are of the sheathed wire type and provide side and bottom heating. The oven interior is removable in three parts and the counterbalanced drop-down door enables dishes to be handled easily.

Below the oven is a removable separately heated storage drawer (485 W), sliding on "Nylon" rollers. This is 7½in high by 16¾in wide by 20½in deep and provides ample capacity for a full 28-piece dinner service.

The overall height of the cooker is 54in (36in to top of hob) and it is 22in wide by 24in deep. It is finished in white or honeysuckle acid resistant vitreous enamel and has an automatic oven-timer and a ringer-timer. The three-plate model costs £74 and the four-plate model £79.

GENERATION AND DEVELOPMENT

Higher Output in January

The rise in electricity output in January was maintained at the higher rate shown by the December figures. The Ministry of Power's monthly statement indicates that 10,076 million kWh was generated by the Central Electricity Generating Board, the North of Scotland Hydro-Electric Board and the South of Scotland Electricity Board last month, compared with 9,630 million kWh in January, 1957, an increase of 11·6 per cent.

Outdoor Meters

In order to try and save the time of meter readers the Thurrock District of the Eastern Electricity Board has installed meters in the outside walls of five new houses in West Thurrock.

ELECTRICITY GENERATED AND SENT OUT FOR PUBLIC SUPPLY

	Fuel consumed Thousand tons			kWh generated Millions			kWh sent out Millions	Installed capacity (m.c.r.) MW
	Coal	Coke and Breeze	Oil	Steam	Water power	Total		
Central Elec. Generating Board	4,616	93	123·6	9,187	19	9,217	8,673	24,234
North of Scotland H.E.B.	20	—	1·6	34	195	236	233	912
South of Scotland E.B.	303	9	0·2	578	45	623	591	1,465
Total for January, 1958	4,939	102	125·4	9,799	259	*10,076	9,497	26,611
Corres. total for January, 1957	4,603	97	14·2	8,725	292	9,030	8,504	24,675
Inc. or dec., per cent	+7·3	+5·4	+784·2	+12·3	−11·3	+11·6	+11·7	+7·8

* The total figure includes generation by other methods amounting to 18 million kWh.

There was no change in the capacity of plant installed, which remained at 26,611 MW.

Electricity generated by industry in the four weeks ended 25th January last amounted to 866 million kWh (3·2 per cent increase).

Leadenhall Market Lighting

The City of London Corporation is recommended to accept the terms of an agreement with the London Electricity Board in connection with the supply of electricity to Leadenhall Market and the installation of a new lighting system.

New Irish Power Stations

The Irish Electricity Supply Board's new power station at Arigna, in County Leitrim, which will come into full operation within the next six months, will be the first Irish station to consume only native coal. Its supplies of 50,000 tons a year will come from the nearby Arigna coal mines. This coal is semi-bituminous with a high ash content (25 per cent minimum). A specially designed boiler-plant has been constructed to take it.

The new station is built on the shores of Lough Allen and is constructed of sheet steel with a rust-proof coating. Its total cost will be about £1,000,000 and its estimated annual output will be 50 million kWh.

The Board will also soon have another new station in commission at Lanesboro', in County Longford. This will be fuelled from machine-won turf supplied by Bord na Mona (Peat Development Board). It will consume about 100,000 tons of turf every year and when in full operation in April will be capable of producing 70 million kWh a year.

The instruments are housed in stout metal boxes and the door, which is fastened securely, can be opened by a special key to obtain access to the sealed fuses. The dial panel is visible through a sheet of reinforced glass.

Mr. J. Unwin, the district manager, estimates that as much as 30 per cent of his meter readers' time is wasted by calls at houses which are unoccupied at the time and he hopes, should this experiment prove successful, to reduce this wastage considerably.

View of the meter showing the cabling and the sealed fuse box with the door open

History and Activities of Irish Board

An account of the work of the Electricity Supply Board of Ireland is given in a specially enlarged issue of *Administration*, published at 7s 6d by the Institute of Public Administration, 12, Leeson Park, Dublin. It extends to more than 170 pages and includes contributions by the Board's chairman (Mr. R. F. Browne) and a number of officers.

Mr. P. J. Dempsey (secretary) sketches the historical background of the E.S.B., Mr. P. G. Murphy (chief engineer) outlines the development of electricity supply, and there are chapters on the activities of their own particular departments by Messrs. J. MacDonald (chief civil works engineer), J. J. O'Doherty, Ph.D. (head of the Transmission Department), R. S. McDowell (head of the System Operation Department), P. J. Dowling (head of the Distribution Department), J. O'Farrell and P. J. Corr (head and deputy head of the Sales Department), J. Fogarty (chief accountant), F. O'Kelly (personnel officer), E. J. Lawler (public relations officer) and S. G. Sedgwick (fisheries manager).

Telephone Charges in Hull

In a reference to recommendations of the Hull Corporation Telephone Department in last week's issue, it was incorrectly reported that reductions in some private hire charges were proposed. The new charges to come into force on 1st April next in fact provide for increased rentals, but certain of the increases for residence rentals are lower than originally proposed.

Rural Electrification in Europe

The United Nations Economic Commission for Europe (E.C.E.) has published a study on the state of rural electrification in Europe in 1956. The report includes chapters on the general position; progress of electrification; technical and economic advances; investment and financing; development of rural electric power consumption; and the development of uses of electric power in rural areas. It has been prepared on the basis of information received from Austria, Bulgaria, Denmark, the Federal Republic of Germany, Finland, France, Greece, Hungary, Ireland, Italy, Luxembourg, Netherlands, Poland, Sweden, Switzerland, Turkey, the U.S.S.R. and the United Kingdom. The report is in French but will shortly be available in English from the Sales Section, European Office of the United Nations, Geneva, Switzerland, price 2s.

DOMESTIC ELECTRICAL EQUIPMENT

Electric Irons

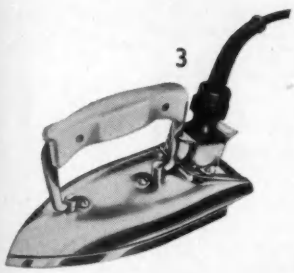
STATISTICS show that electric irons are used in over 90 per cent of the houses wired for electricity in this country. Altogether there are almost thirty manufacturers listed in the following survey, the majority of whom produce more than one design in their respective ranges. These include automatic and non-automatic types, steam models and travelling irons. Undoubtedly the most popular of these is the automatic type, which incorporates a bi-metal thermostat controlled by a heat regulator and, in most cases, a pilot light to indicate when the current is on.

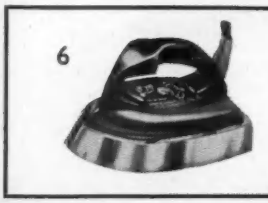
With their moulded handles and streamlined shapes and, more recently, coloured bodies and handles, modern electric irons are attractive items of domestic equipment and will give virtually trouble-free service for a number of years. The average loading of the automatic types is 750 W and the weight varies between 4 and 5 lb. Lightweight models (2 to 2½ lb) are, however, also available. The non-automatic, or standard iron, also varies between 4 and 5 lb in weight but has the lower loading of 400 to 500 W. Special lightweight irons with fold-flat handles are ideal for travelling purposes and several can be used on any voltage between 110 and 250. The steam iron, when charged with water, eliminates the need for damping-down articles before ironing. It can also be used "dry," as an ordinary iron. Only two manufacturers, namely Hoover and Morphy-Richards, now remain in this field.

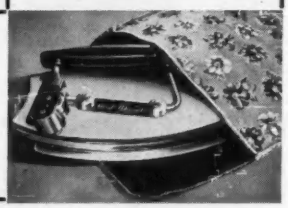
One of the latest automatic irons to be announced is the Easipower "1000." A special feature of this iron is that an on/off switch is incorporated in the heat control knob.

Manufacturer	Name or Model	Type	Weight	Loading	Special Features	Finish	Price (Excl. Tax)	Purchase Tax
A.B. METAL PRODUCTS, LTD., Ynysbooth, Abercynon, Glamorgan.	"Clem"	Travelling	1½ lb	80 W	Universal voltage	Anodised body, chromium sole plate	£1 15 0	£0 7 10
BYLOCK ELECTRIC, LTD., South Street, Enfield, Middlesex.	"Victor"	Automatic, tilting safety	5 lb	750 W	Left or right handed	Pastel-primrose, blue or green	£3 2 6	£0 13 9
CARRON COMPANY, Carron, Falkirk, Stirlingshire.	"Carron"	Non-Automatic	5 lb	450 W	—	Nickel plated	£1 3 6	£0 5 2
CO-OPERATIVE WHOLESALE SOCIETY, LTD., National Works, Hall Street, Dudley.	"Senior"	Automatic	4½ lb	800 W	—	Chromium	£2 5 0	£0 9 11
	"Major"	Non-Automatic	5½ lb	550 W	—	Chromium	£1 10 9	£0 6 9
	"Minor"	Non-Automatic	4½ lb	450 W	—	Chromium	£1 2 0	£0 4 10
EASIPOWER, LTD., 27, Albemarle Street, London, W.1.	"1000"	Automatic	4½ lb	750 W	On/off switch on control knob, a.c. only	Chromium	£2 15 0	£0 12 1
ELGA PRODUCTS, LTD., Railway Place, Wimbledon, S.W.19.	"Gadabout"	Travelling	1½ lb	300 W	Fold flat handle	Chromium (*a*) or coloured enamel (*b*)	£2 2 0 (*a*) £2 19 6 (*b*)	£0 9 3 (*a*) £0 8 8 (*b*)
FALK, STADELMANN & CO., LTD., 91, Farringdon Road, London, E.C.1.	"Featherlight" 95658	Automatic	3 lb	750 W	Left or right handed, pilot light	Chromium	£2 2 0	£0 9 2
	"Pilot" 95707	Automatic	4½ lb	750 W	Left or right handed, pilot light	Chromium	£2 2 0	£0 9 2
	"Standard" 95669	Non-Automatic	4½ lb	450 W	Left or right handed	Chromium	£1 8 6	£0 6 0
	"Globetrotter" 95706	Travelling	2 lb	300 W	Folding handle, 110 and 200/250 V	Chromium	£1 15 8	£0 7 10
GATEHILL MANUFACTURING CO. LTD., Beco Works, Kennard Road, Stratford, E.15.	"Golden Arrow"	Automatic	5½ lb	750 W	—	Coloured body, chromium sole plate	£1 15 0	£0 7 7
	"Silver Arrow"	Automatic	5½ lb	750 W	—	All chromium	£2 1 0	£0 8 11
	"Beco Safety"	Non-Automatic	4 lb	450 W	—	Coloured body, chromium sole plate	£0 18 0	£0 3 11
	"Beco Safety"	Non-Automatic	4 lb	450 W	—	Chromium	£0 18 11	£0 4 1
GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, London, W.C.2.	"Superspeed" D.5851	Automatic	2½ lb (approx.)	750 W	Light weight, pilot light, snap-action thermostat	Chromium (*a*) or cream vitreous enamel (*b*)	£2 5 1 (*a*) £1 19 4 (*b*)	£0 9 11 (*a*) £0 8 8 (*b*)

Manufacturer	Name or Model	Type	Weight	Loading	Special Features	Finish	Price (Excl. Tax)	Purchase Tax
GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, London, W.C.2. *(continued)*	"Superspeed" D.5854	Automatic	4½ lb (approx.)	750 W	Medium weight, pilot light, snap action thermostat	Chromium (*a*) or cream vitreous enamel (*b*)	£2 5 1 (*a*) £1 19 4 (*b*)	£0 9 11 (*a*) £0 8 8 (*b*)
	D.5805	Standard	5 lb (approx.)	450 W	Streamlined	Chromium	£1 12 5	£0 7 1
	D.5827	Travelling	3 lb (approx.)	300 W	Fold flat handle, universal voltage	Chromium	£2 19 5	£0 13 1
GRAFTON HEATER CO., LTD., 13-15, Westland Place, City Road, N.1.	1	Non-Automatic	5 lb	450 W	Handle in various colours	Nickel plated	£0 19 0	£0 4 3
	2	Non-Automatic	5 lb	450 W	Handle in various colours, connector guard	Nickel plated	£0 19 6	£0 4 5
	6	Non-Automatic	5 lb	450 W	Heat indicator dial	Nickel plated	£1 7 11	£0 6 5
	7	Non-Automatic	5 lb	500 W	Complete with iron stand	Nickel plated	£1 12 6	£0 7 4
	8	Non-Automatic	7½ lb	600 W	Laundry type	Nickel plated	£1 5 6	£0 5 9
	9	Travelling	2½ lb	250 W	Detachable handle	Nickel plated	£0 14 6	£0 3 3
	10	Safety	3½ lb	500 W	Fixed thermostat, a.c. only	Nickel plated	£1 7 11	£0 6 5
	DD1 and DD2	Automatic	4½ lb	750 W	Pilot light	Primrose, green or blue (*a*), chromium (*b*), or chromium with coloured handles (*c*)	£1 17 6 (*a*) £2 2 6 (*b*) £2 7 6 (*c*)	£0 8 5 (*a*) £0 9 7 (*b*) £0 10 8 (*c*)
	DD3 and DD4	Automatic	4½ lb	750 W	Pilot light	Primrose, green or blue (*a*), chromium (*b*), or chromium with coloured handles (*c*)	£2 2 6 (*a*) £2 7 6 (*b*) £2 12 6 (*c*)	£0 9 7 (*a*) £0 10 8 (*b*) £0 11 10 (*c*)



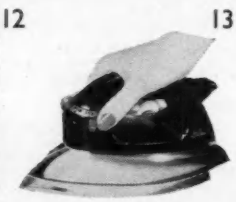


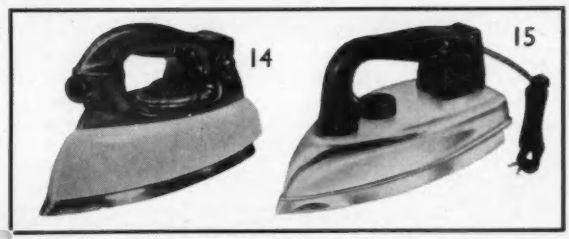


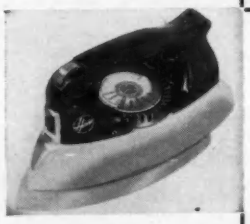
1. *Grafton automatic iron*
2. *Falk, Stadelmann "Globetrotter" travelling iron*
3. *G.E.C. travelling iron*
4. *G.E.C. "Superspeed" automatic iron*
5. *C.W.S. "Senior" automatic iron*
6. *"Clem" travelling iron (A.B. Metal Products)*
7. *Elga "Gadabout" travelling iron*
8. *Bylock "Victor" safety iron*
9. *Easipower "1000" automatic iron*
10. *Carron non-automatic iron*
11. *Gatehill "Golden Arrow" automatic iron*

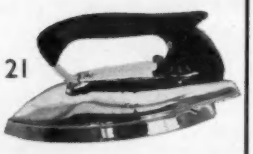
Manufacturer	Name or Model	Type	Weight	Loading	Special Features	Finish	Price (Excl. Tax)	Purchase Tax
L. G. HAWKINS & CO., LTD., 30-35, Drury Lane, Kingsway, W.C.2.	"Universal" L.G.H.1220	Automatic	4½ lb	800 W (a.c. only)	Dial controls include on/off switch	Black, maroon or cherry handle, chromium body	£2 9 6	£0 10 10
	"Hawkins" L.G.H.1310	Non-Automatic	4¼ lb	450 W	Design similar to L.G.H.1220	Cream, blue or green	£1 5 0	£0 5 6
	"Hawkins" L.G.H.1315	Non-Automatic	4¼ lb	450 W	Design similar to L.G.H.1220	Nickel plated	£1 7 6	£0 6 0
H.M.V. HOUSEHOLD APPLIANCES, Hayes, Middlesex.	"Milady's Iron" IC10	Automatic	4 lb	750 W	Left or right handed, pilot light	Yellow heat resisting enamel	£1 19 9 £2 3 0 (a.c./d.c.)	£0 8 9 £0 9 6 (a.c./d.c.)
HOOVER, LTD., Perivale, Greenford, Middlesex.	"Steam-or-Dry"	Automatic	3½ lb (dry) 4 lb (filled)	1 kW	Left or right handed, easy-to-read dial with 7 temperature settings	Chromium with brown plastic dial control and handle	£3 17 6	£0 17 6
THE HOTPOINT ELECTRIC APPLIANCE CO., LTD., Crown House, Aldwych, W.C.2.	Hotpoint "Plus Five" 658C1	Automatic	5½ lb	800 W	Swivel flex, button nooks on sole	Chromium	£3 5 0	£0 14 3
	Premier "Super Smoothwell" 835 · 833	Automatic	5 lb (835) 3 lb (833)	750 W	Pilot light, snap action thermostat	Chromium	£2 5 0	£0 9 11
	Premier "Nine-O-Nine" 909	Automatic	5 lb	1 kW and 800 W	Left or right handed, light in front of handle	Chromium	£4 2 6	£0 18 2
	Premier "Smoothwell" 814	Non-Automatic	4¼ lb	450 W	Hard wearing	Chromium	£1 12 6	£0 7 2
JELSON ELECTRIC, LTD., Spring Road, Tyseley, Birmingham, 11.	MX20	Automatic	4½ lb	800 W	—	Chromium	£2 5 0	£0 9 11
LINCASS ELECTRIC, LTD., White Hart Yard, Guildford Street, Chertsey, Surrey.	134 and 144 (a.c./d.c.)	Non-Automatic	4½ lb	450 W	Left and right handed	Coloured (134) and chromium (144)	£1 5 6 (134) £1 7 6 (144)	£0 5 7 (134) £0 6 0 (144)
	434P and 444P	Automatic	4½ lb	750 W	Pancake selector dial, left and right handed, pilot light	Coloured (434P) Chromium (444P)	£1 19 6 (434P) £2 2 6 (444P)	£0 8 7 (434P) £0 9 4 (444P)
	436P (a.c./d.c.) and 446P (a.c./d.c.)	Automatic	4½ lb	750 W	Pancake selector dial, left and right handed, pilot light	Coloured (436P) Chromium (446P)	£2 2 6 (436P) £2 5 6 (446P)	£0 9 4 (436P) £0 9 11 (446P)
	444PH	Automatic	6 lb	750 W	Pancake selector dial, left and right handed, pilot light	Chromium	£2 7 6	£0 10 5
	444PHS and 446PHS (a.c./d.c.)	Automatic	7 lb	1 kW	Pancake selector dial, left and right handed, pilot light	Chromium	£2 12 6 (444PHS) £2 15 6 (446PHS)	£0 11 5 (444PHS) £0 12 2 (446PHS)
METWAY ELECTRICAL INDUSTRIES, LTD., Canning Street, Kemp Town, Brighton, 7.	DA224 (*a*) DA226 (*b*) and DA225 (*c*)	Non-Automatic	5 lb	450 W	Nickel sole plate	Coloured (*a*), nickel (*b*) and chromium (*c*)	£1 2 4 (*a*) £1 2 9 (*b*) £1 5 0 (*c*)	£0 4 10 (*a*) £0 4 11 (*b*) £0 5 5 (*c*)
	DA439 (*a*) and DA446 (*b*)	Automatic	4½ lb	700 W	Chromium sole plate	Coloured (*a*) and chromium (*b*)	£2 3 9 (*a*) £2 4 6 (*b*)	£0 9 6 (*a*) £0 9 7 (*b*)
	DA186	Travelling	2 lb	150 W	Nickel sole plate	Nickel or coloured	£0 18 6	£0 4 0
MORPHY-RICHARDS, LTD., 50, Conduit Street, London, W.1.	"Senior" CA/75	Automatic	4½ lb	750 W	Pilot light, fabric selector, thermostatic control	Primrose, blue or green (*a*) and chromium (*b*)	£1 19 6 (*a*) £2 5 0 (*b*)	£0 8 7 (*a*) £0 9 9 (*b*)
	"Senior" CU/75	Automatic	4½ lb	750 W	Pilot light, fabric selector, thermostatic control, a.c./d.c.	Primrose, blue or green (*a*) and chromium (*b*)	£2 4 6 (*a*) £2 10 0 (*b*)	£0 9 8 (*a*) £0 10 10 (*b*)
	"Senior" PA/75	Automatic	4½ lb	750 W	Pilot light, fabric selector, thermostatic control	Primrose, blue and green porcelain body	£2 5 0	£0 9 9
	"Senior" PU/75	Automatic	4½ lb	750 W	Pilot light, fabric selector, thermostatic control, a.c./d.c.	Primrose, blue and green porcelain body	£2 10 0	£0 10 10
	"Atlantic" LA/75	Automatic	2⅞ lb	750 W	Pilot light thermostatic control, fabric selector	Primrose, blue or green (*a*) and chromium (*b*)	£1 19 6 (*a*) £2 5 0 (*b*)	£0 8 7 (*a*) £0 9 9 (*b*)

Manufacturer	Name or Model	Type	Weight	Loading	Special Features	Finish	Price (Excl. Tax)	Purchase Tax
MORPHY-RICHARDS, LTD., 50, Conduit Street, London, W.1. (*continued*)	"Atlantic" LU/75	Automatic	2¾ lb	750 W	Pilot light, thermostatic control, fabric selector, a.c./d.c.	Primrose, blue or green (*a*) and chromium (*b*)	£2 4 6 (*a*) £2 10 0 (*b*)	£0 9 8 (*a*) £0 10 10 (*b*)
	"Power" AP/10	Automatic	6½ lb	1,000 W	Heavy duty, pilot light, thermostatic, fabric selector	Chromium	£2 12 6	£0 11 5
	"Power" UP/10	Automatic	6½ lb	1,000 W	Heavy duty, a.c./d.c., pilot light, thermostatic, fabric selector	Chromium	£2 17 6	£0 12 6
	"Steam-and-Dry" ZA/75	Automatic	3 lb (dry) 3¼ lb (filled)	750 W	Pilot light, thermostatic, fabric selector, filler and de-scaling fluid	Chromium	£3 5 0	£0 14 1
	"Steam-and-Dry" ZU/75	Automatic	3 lb (dry) 3¼ lb (filled)	750 W	Pilot light, thermostatic, fabric selector, filler and de-scaling fluid, a.c./d.c.	Chromium	£3 10 0	£0 15 2
PIFCO, LTD., Watling Street, Manchester, 4.	1042	Automatic	5 lb	750 W	Streamlined, built-in pilot light	Chromium	£2 4 11	£0 9 10
T. PRICE & SON (STAMPERS), LTD., Spring Hill Passage, Birmingham, 18.	"Prilect" 2027A	Travelling	2 lb	150 W	Wooden handle	Nickel plated	£0 12 11	£0 2 10
	"Prilect" 2027B	Travelling	2 lb	150 W	Moulded handle	Chromium plated	£0 16 6	£0 3 8
	"Prilect" 2111	Travelling	2 lb	150 W	Moulded handle, universal voltage	Nickel plated	£1 3 9	£0 5 3









12. *H.M.V. "Milady's Iron"*
13. *Sunbeam "Ironmaster" lightweight iron*
14. *Morphy-Richards "Steam-and-Dry" iron*
15. *Pifco model 1042 automatic iron*
16. *Hotpoint "Plus Five" iron*
17. *Hoover "Steam-or-Dry" iron*
18. *Lincass automatic iron, model 444*
19. *Jelson "MX20" automatic iron*
20. *Morphy-Richards "Senior" model CA/75 iron*
21. *L. G. Hawkins "LGH 1220" automatic iron*
22. *Revo "Automatic" iron*
23. *Hotpoint Premier "Nine-O-Nine" iron*
24. *Metway automatic iron*
25. *Robson "Roblec" automatic iron*

Manufacturer	Name or Model	Type	Weight	Loading	Special Features	Finish	Price (Excl. Tax)	Purchase Tax
T. PRICE & SON (STAMPERS), LTD., Spring Hill Passage, Birmingham, 18. *(continued)*	"Prilect" 2085B	Automatic	4 lb (approx.)	700 W	Moulded handle	Chromium plated	£1 10 0	£0 6 7
	"Prilect" 2131	Automatic	4½ lb (approx.)	700 W	Moulded handle, pilot light	Chromium plated	£1 15 0	£0 7 8
	"Prilect" 2124	Non-Automatic	4 lb (approx.)	450 W	Moulded handle	Chromium (*a*) or nickel plated (*b*)	£0 19 2 (*a*) £0 17 6 (*b*)	£0 4 2 (*a*) £0 3 10 (*b*)
REVO ELECTRIC CO., LTD., Tipton, Staffs.	"Automatic"	Automatic	4½ lb	650 W	Left and right handed thumb rest, pilot light	Chromium (*a*) or art enamel (*b*) or porcelain enamel (*c*) colours	£2 4 9 (*a*) £1 19 3 (*b*) £2 7 6 (*c*)	£0 9 10 (*a*) £0 8 7 (*b*) £0 10 5 (*c*)
ROBSON ELECTRICAL PRODUCTS, LTD., Ultralite Works, Union Street, West Bromwich.	"Explorer"	Non-Automatic	5 lb	450 W	—	Coloured or nickel plated	£0 19 6	£0 4 5
	"Ultralite"	Non-Automatic	5 lb	450 W	—	Chromium	£1 3 0	£0 5 2
	"Roblec"	Automatic	4½ lb	750 W	—	Coloured or nickel plated	£1 13 9	£0 7 7
	"Roblec"	Automatic	4½ lb	750 W	Pilot light	Chromium	£1 19 6	£0 9 0
	"Roblec Junior"	Travelling	2 lb	200 W	—	Coloured	£0 15 6	£0 3 6
SCOTTISH PRECISION ENGINEERING CO., LTD., 27, Cadogan Street, Glasgow, C.2.	"Rob Roy Superflow"	Automatic	4½ lb	750 W	Control knob in handle, pilot light	Chromium (*a*) and enamelled pastel shades (*b*)	£2 3 2 (*a*) £2 0 9 (*b*)	£0 9 4 (*a*) £0 8 9 (*b*)
	"Rob Roy Nu-flow"	Automatic	3¾ lb	500 W	Translucent knob acts as pilot light	Chromium (*a*) and enamelled pastel shades (*b*)	£1 17 0 (*a*) £1 14 6 (*b*)	£0 8 0 (*a*) £0 7 6 (*b*)
	"Rob Roy Handymaid"	Non-Automatic	4 lb	450 W	Finger grip handle	Chromium (*a*) and enamelled pastel shades (*b*)	£1 3 7 (*a*) £1 0 7 (*b*)	£0 5 1 (*a*) £0 4 5 (*b*)
SELEX ELECTRIC CO. (KIRKBY), LTD., Yardley Road, Kirkby Industrial Estate, Liverpool.	"Xcel" A.2004	Non-Automatic	5 lb	450 W	Left or right handed, reversible flex	Chromium	£1 12 6	£0 7 2
HENRY SIMS, 191, Goldhurst Terrace, London, N.W.4.	"Simfold" Standard	Travelling	2 lb	300 W	Fold-flat handle	Chromium	£2 1 9	£0 9 2
	"Simfold" Universal	Travelling	2 lb	300 W	Fold-flat handle, 110-250 V range	Chromium	£2 11 9	£0 11 4
	"Mavec"	Non-Automatic	4½ lb	450 W	200/250 or 110/120 V	Cream, blue or light green	£0 16 8	£0 3 8
SUNBEAM ELECTRIC, LTD., Nerston, East Kilbride, Lanarkshire.	"Ironmaster"	Lightweight automatic	2 lb	875 W	Thumb-tip control incorporating "off" switch in handle	Chromium, moulded handle	£2 8 0	£0 10 6
J. & H. WALTER, LTD., Garth Road, Morden, Surrey.	"Walter No-Cord"	Automatic	5 lb	900 W	Cordless and complete with ironing table	Cream	£9 17 6	£1 2 3
F. WESTERMAN (WHOLESALE), LTD., 94, Dale End, Birmingham, 4.	"Welec Glide-Eesi"	Non-Automatic	4 lb	450 W	Streamlined	Nickel plated	£0 17 11	£0 4 0

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26. *Westerman "Welec Glide-Eesi" non-automatic iron*
27. *"Rob Roy Handymaid" non-automatic iron (Scottish Precision Engineering Co.)*
28. *Selex "Xcel" non-automatic iron*
29. *Sims "Simfold" travelling irons*

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ELECTRIC STEAM IRONS

A NEW British Standard, prepared with the full co-operation of the trade interests concerned, establishes a minimum standard of safety and a satisfactory standard of mechanical and electrical construction for domestic electric steam irons. This will form Part 2 of B.S. 1732 : 1958; the present Standard for ordinary electric irons (B.S. 1732 : 1951) will shortly be revised and published as Part 1 of the same specification.

B.S. 1732 (Part 2) sets out requirements for two types of iron, "drip feed" and "boiler" (these terms are defined in the specification). The heating elements of both types are for operation on voltages exceeding 30 V r.m.s. a.c., or 50 V d.c., but not exceeding 250 V a.c. or d.c.

After laying down "constructional requirements," the Standard provides a set of rigorous tests to be carried out by the manufacturer in order to ensure that the irons are "fit for their job." There are tests relating to loading, insulation, mechanical shock, pressure, earthing, temperature, flexible cord guard and cord anchorage, inaccessibility of live parts, endurance and vibration. The endurance test lasts 480 hours; during this period the iron must be operated on a cycle giving eight hours' steaming, eight hours' dry heating, and at least eight hours' cooling (the cooling period not to be included in the 480 hours' operating period). The iron's water container must be filled with distilled water during the first 120 hours of steaming, and, subject to a specified exception, with water of a given hardness during the second 120 hours of steaming. At the end of the test the insulation resistance of the iron must be satisfactory within stated limits.

An appendix to the Standard deals with the method of measuring leakage current.

"British Standard" electric steam irons can be identified by the compulsory marking of B.S. 1732 (Part 2) on either the appliance or a label attached to it. Manufacturers so licensed may also apply B.S.I.'s "Kite-mark."

Copies of this Standard may be obtained from the British Standards Institution, Sales Branch, 2, Park Street, London, W.1, price 5s.

NEW BOOKS

Three Steps to Victory. By Sir Robert Watson-Watt. Pp. 480; illus. Odhams Press, Ltd., Long Acre, London, W.C.2. Price 30s.

The author could not have undertaken the writing of this book unless he had felt very deeply the need to put this story on record. Having decided to do it he has fulfilled his task with characteristic thoroughness which may tempt all but the most serious readers to skip a good many pages.

The book gives something of the background of the author, his early life, and the circumstances which led up to his selection as the man to lead a team to develop a radar defence system.

Then the story unfolds and a very revealing story it is which will convince the reader that the choice of Watson-Watt for the task was a most fortunate one. Although a scientist and an inventor he at once recognised that there was no time to try to achieve the best, but that every temptation to wait for improvements had to be resisted whilst an immediately practical system was put into operation. Improvements could come later, and they did.

The author's record of his dealings with the Royal Commission on Awards is disappointing as it reveals a good deal of bitterness. The business of the Commission was to be fair, but nevertheless cautious, in distributing public money. It was not sufficient evidence for the Commission that Watson-Watt's work had been almost universally acclaimed and that he was generally regarded as "the father of radar," and so to a sensitive claimant the Commission's investigation may well have seemed unduly harsh.

There is so much in this book of the greatest importance, both technically and as an historical record, that there can be few with any experience with radar during the war, or engaged in the present developments which have come from it, who will not read and study the book with a feeling of real gratitude to the author (a very busy man) who has put so much time and care into its preparation.

Marine Electrical Practice. By G. O. Watson, M.I.E.E., Fel.A.I.E.E., M.I.Mar.E. Pp. 325; figs. 182. George Newnes, Ltd., Tower House, Southampton Street, London, W.C.2. Price 35s.

Textbooks dealing with the electrical equipment of ships are not common; neither are authors with the background of experience and authority possessed by Mr. Watson. It is obvious, therefore, that the work must be a useful addition to the literature available on the subject. However, one could wish for a wider and more general treatment of some aspects of marine electrical engineering and for some pruning in other directions.

The author says his book is intended for engineers who are concerned not with the design of machines and apparatus but with their performance and characteristics, yet he treats in some detail the design of busbars (surely the switchgear engineer's job !) while dismissing in seven pages the types and characteristics of electric motors, both a.c. and d.c. In this section, incidentally, the double-cage squirrel-cage motor is described (and misnamed the Boncherot type) but no reference is made to the "Trislot" motor which has been used for a great number of ships' applications owing to its superior starting performance.

A desirable chapter would have been one surveying the general question of direct or alternating current supply for ships. Most of the published work on this question has come from manufacturers, who are naturally a little suspect, and Mr. Watson could have performed a service by summarising the arguments.

A surprising omission is a section on ships' cargo winches and other deck auxiliaries. On a medium-size cargo ship the winches can represent a connected load of 500 h.p. or more, and are particularly deserving of consideration when the supply is a.c. Despite the omissions, however, this book contains a great deal of information of practical value and should help marine engineers to cope with the growing complexity and importance of the electrical installations of modern ships.

May one ask the publishers to keep an eye on Lloyd's regulations and to issue an amendment slip when necessary, as may be the case shortly in connection with the tables of the permissible temperature rise for machines.—T.J.B.

BOOKS RECEIVED

Electronic Measuring Instruments. By E. H. W. Banner. Pp. 496; figs. Chapman & Hall, 37, Essex Street, London, W.C.2. Price 56s.

Welding Handbook. Part I. Edited by Arthur L. Phillips. Pp. 11.27; figs. Cleaver-Hume Press, Ltd., 31, Wright's Lane, Kensington, London, W.8. Price 72s.

Telecommunication Economics. By T. J. Morgan. Pp. 452; figs. Macdonald & Co., Ltd., 16, Maddox Street, London, W.1. Price 50s.

Financial Section

STOCKS and SHARES

GILT-EDGED securities stood their ground firmly during the past week, but the industrial markets of the Stock Exchange continued to find the going very heavy. America's trade recession, and conflicting views about its likely extent and duration, seemed to be the main influence, for the result of the Rochdale by-election and other events nearer home made relatively little impression on the course of prices. In the electrical equipment market, morale was lifted by the excellent figures in the English Electric Company's preliminary statement of the results for 1957, while another good report from International Combustion also assisted confidence. A resounding success for the Babcock & Wilcox 6 per cent debenture issue confirmed the high popularity of this type of security in prevailing conditions.

English Electric Dividend

Satisfaction with the English Electric results was registered by an initial recovery of 2s in the price of the company's £1 shares, which had been down to 44s 6d before the announcement. After some fluctuation the quotation finished the week with little change, on balance, at 46s 3d. The final dividend, making a total of 14 per cent for the year as before, is in accordance with the directors' forecast at the time of last April's big issues of debenture stock and new ordinary shares. The latter rank for the 1957 dividends, which are paid therefore on £18·27 million ordinary stock, against the previous amount of £15·22 million, and involve the distribution of £1·47 million net, or about £245,000 more than before.

Increased Earnings

English Electric's group profit of £9·7 million for 1957 is above market expectations which, in view of the evidence of contracting profit margins in most fields of industry, had been prepared to see little change on the previous figure of just over £9 million. Tax charges are larger at £3·6 million, and depreciation at £2·78 million has gone up by nearly half a million, but after other provisions the net surplus of £2·95 million still comes out comfortably above the 1956 level. Allowing for special transfers and the preference dividends, the earnings are calculated as equivalent to 32 per cent gross on the ordinary capital. At a price of 46s 3d, the company's £1 shares stand not very much above the lowest prices recorded in 1957–58, and almost £1 below the best in that period. On the 14 per cent dividend the yield just exceeds 6 per cent.

Babcock Debenture

Early dealings in the new issue of £2 million Babcock & Wilcox 6 per cent debenture stock took place at a premium of over 3 points on the price of 97 at which the company's stockholders had the profitable opportunity to apply for it. Stocks of this character, offering yields of around 6 per

Price Changes in

Company or Board	Nom. Value	Middle price 17th Feb.	Week's Rise or Fall	Dividend Previous	Dividend Last	Yield %	1957 Highest	1957 Lowest
Gilt-edged Stocks						£ s d		
Brit. Elec. 1968/73	100	74		3	3	4 1 0	80	70
Brit. Elec. 1974/77	100	70		3	3	4 5 9	78½	66
Brit. Elec. 1976/79	100	74½		3½	3½	4 14 0	81½	70
Brit. Elec. 1974/79	100	85½		4¼	4¼	4 19 6	92½	79½
Overseas Electric Supply								
Calcutta Elec.	£1	15/9	−3d	6†	6·8†	8 13 0†	19/-	15/-
East African Power	£1	18/6		7	7½	8 2 3	21/-	19/-
Nigerian Elec.	£1	16/6		10	10	12 2 6	18/6	16/6
Perak Hydro-Elec.	£1	15/-		10	12½	16 13 3	18/-	13/3
Electrical Shares								
Aberdare Cables	5/-	10/6		17½	17½	8 6 9	12/-	9/9
Aerialite	1/-	5/6	−3d	48	51¼	9 7 3	6/9	4/9
Allen, W. H.	£1	34/6		10	10	5 16 0	47/3	33/6
Anglo-Portuguese Tel.	£1	20/9	−6d	8	8	7 14 3	27/6	20/6
Aron Elec. Ord.	£1	54/-		15	15	5 11 0	60/-	53/6
Assoc. Elec. Ord.	£1	47/6	−1/3	15	15	6 6 3	73/-	48/9
Automatic Tel. & El.	£1	60/9		15	17	5 11 9	75/-	54/6
Babcock & Wilcox	£1	43/9		15	13‡	5 18 9	82/6	54/9
Bakelite	10/-	20/6		16	15	7 6 3	24/6	20/9
Baldwin, H. J.	2/-	3/6	+3d	20	20	11 8 6	5/-	3/9
Berry's Electric	5/-	6/-		—	10	8 6 9	6/6	5/6
British Aluminium	£1	44/6		12	12	5 7 9	71/3	38/9
Brit. Elec. Traction: Def. Ord. "A"	5/-	22/-	+6d	22½	25	5 13 9	25/-	17/-
B.I. Callender's	£1	41/3	−1/-	12½	12½	6 1 3	55/-	39/6
B.I. Callender's 6% Pref.	£1	20/-		6	6	6 0 0	21/9	19/-
British Tabulating	£1	40/9		9	10	4 18 3	56/3	37/6
British Thermostat	5/-	21/3		25	25	5 17 9	27/6	21/3
British Vac. Cleaner	5/-	5/-		15	10	10 0 0	8/-	5/-
Brook Motors	10/-	35/-		25	25	7 2 9	37/6	30/-
Bulgin, A. F.	1/-	4/9		50	40*	8 8 6	5/6	4/-
Burco Dean	5/-	8/3	+3d	20	22½	9 1 9*	9/4	5/10
Cable & Wireless: Ord.	5/-	10/6		10	10	4 15 3	12/6	9/6
4% Loan	100	93½		4	4	4 5 6	92½	89
Chloride El. Storage "A"	£1	57/6	+6d	17½	17½	6 1 9	68/9	55/9
Clarke Chapman	£1	135/-	−5/-	22½	27½	4 1 6	9	5‡
Cole, E. K.	5/-	15/9	−6d	17½	17½	5 11 0	23/6	16/6
Cossor, A. C.	5/-	4/9	−3d	Nil	2½	2 12 9	7/3	5/-
Crabtree	10/-	25/3		20	20	7 18 6	26/-	23/3
Crompton Parkinson Ord.	5/-	8/6	−3d	16	16	6 5 6*	11/9	9/3
De La Rue	5/-	22/9		30	35	7 13 9	24/9	16/3
Decca "A"	4/-	22/6	−9d	43¾	43¾	7 15 6	32/3	22/-
Desoutter	5/-	14/3	+3d	30	32½	5 14 0*	17/9	13/9
Dewhurst	2/-	7/6		16½	20	5 6 9	7/9	5/9
Dictograph Tel.	2/-	5/3		20	20*	7 12 6	6/3	5/3
Dubilier Condenser	1/-	3/3		30	30	—	5/3	3/-
Duport	5/-	8/3		25	25	7 11 6*	10/6	8/6
E.M.I.	10/-	29/-	−1/6	15	15	5 3 6	36/-	23/9
Electrical Components	5/-	7/6		25	12½*	8 6 9	8/-	6/6
Elec. Construction	£1	21/3		8½	8½	8 0 0	27/6	21/9
Elliott-Automation	5/-	12/3	−3d	—	10‡	4 1 9	12/6	10/3
Enfield Cable Ord.	£1	11/6		Nil	Nil	Nil	21/6	12/3
English Electric	£1	46/3		14	14	6 1 0	65/-	47/6
English Electric 3½% Pref.	£1	12/3		3½	3½	6 2 6	14/3	11/3
Ericsson Tel.	5/-	18/6	−6d	20†	22†	2 19 6*†	25/-	17/-
Ever Ready	5/-	14/3		35	37½	6 11 6*	20/-	14/-
Falk Stadelmann	£1	37/-	−6d	17½	17½	9 9 3	40/6	35/-

The above quotations are based upon middle prices in the Stock Exchange Daily Official List
* After scrip issue. † Free of income tax. ‡ Dividend indicated.

cent over extended periods with first-class security, are at present in great demand and by no means plentiful supply. This issue is redeemable at 100 between 1980 and 1983. Interest dates are at end-March and September, with a first dividend of 63s 7d per cent next September. It is at present £25 per cent paid-up, with a further instalment of the same size due by 7th March and the final £47 per cent by 15th April. Until then, a buyer saves the usual expense of the 2 per cent transfer stamp duty.

Electrical Investments

Company or Board	Nom. Value	Middle price 17th Feb.	Week's Rise or Fall	Dividend Previous	Dividend Last	Yield % £ s d	1957 Highest	1957 Lowest
Electrical Shares—continued								
G.E.C. Ord.	£1	31/3	−1/3	14	12½	—	58/9	37/6
G.E.C. 6½% Pref.	£1	21/-		6½	6½	6 3 9	23/6	19/6
General Cables	5/-	12/-		30	24	10 0 0	15/6	11/6
Greenwood & Batley	£1	47/3	−3d	17½	17½	7 8 3	51/3	45/3
Hackbridge Holdings	5/-	9/-	−9d	30	20	11 2 3	21/9	11/3
Hackbridge & Hewittic	5/-	11/3		23	20	8 17 9	16/-	10/-
Head Wrightson	5/-	18/9		20	22½	—	24/3	16/6
Heatrae	2/-	4/9		15	15	6 6 3	4/9	4/-
Henley's	10/-	12/6	−1/-	11½	11½	9 4 0	17/-	11/-
Holophane	5/-	13/3		30	37½	8 9 9*	15/9	10/3
Hoover	5/-	32/6		50	50	7 13 9	44/-	24/9
I.C.I.	£1	37/6	−1/6	10	10	5 6 9	46/6	36/3
Intl. Combustion	5/-	22/-	+2/-	22½	25	5 13 9	30/-	19/3
Johnson & Phillips	£1	17/6		15	10	11 8 6	34/6	18/9
Lancashire Dynamo	£1	31/3	−1/3	11	11	7 0 9	45/9	33/6
Laurence, Scott	5/-	13/3	−6d	15	15	5 13 3	19/9	13/9
Lister, R. A.	£1	24/3	−6d	10	10	8 5 0	33/9	23/3
London Elec. Wire	£1	41/3	−9d	12½	12½	6 1 3	53/9	40/9
Lucas, J.	£1	29/6		7½	7½	5 1 9	36/6	27/6
Marconi Marine	£1	32/-	+1/-	10	10	6 5 0	37/-	30/-
Marryat & Scott	2/-	10/6		30	35	6 13 3	13/-	8/-
Mather & Platt	£1	45/-	−9d	15	15	6 13 3	63/9	47/-
Metal Industries	£1	25/6x.d.	−1/-	Nil	9	7 1 3	30/-	20/3
Midland Elec. Mfg.	£1	47/6		12½	12½	5 5 3	52/6	45/-
Morphy-Richards	4/-	15/-		50	20*	5 6 9	20/-	11/6
Murex	£1	55/6	−3d	20	20	7 4 3	79/6	58/3
Newman Ind.	2/-	2/9		10	10	7 5 6	2/11	2/1
Oldham & Son	1/-	2/6		17½	17½	7 0 0	3/-	2/3
Parnall (Yate)	5/-	6/-		12	12	10 0 0	8/9	5/9
Parsons, C. A.	£1	45/-	−1/6	8½	7½*†	—	71/3	45/-
Plessey	10/-	56/3	−1/3	30	30	5 6 9	86/3	60/-
Pye "A" Deferred	5/-	11/3	−9d	12½	12½	5 11 0	20/-	12/-
Reyrolle	£1	78/9	−3/9	16½	17½	4 9 0	110/-	72/-
Rheostatic	4/-	7/9		18½	12½*	6 9 0	10/-	7/-
Richardsons Westgarth	10/-	15/-		16¾	16¾	5 11 3*	20/-	13/6
Scottish Cables	4/-	12/9	−6d	27½	27½	8 12 6	19/3	13/3
Simon-Carves	5/-	23/9	−6d	28½	20*	4 4 3	36/3	23/9
Smith (England), S.	4/-	7/6	−3d	17½	20	5 6 9*	8/-	6/3
Southern Areas	£1	11/3		7½	7½	13 16 9	20/-	11/3
Strand Elec.	5/-	5/9		15	15	13 0 9	8/-	5/9
Sturtevant	5/-	18/-		15†	15†	4 3 3†	27/-	17/9
Sun Elec.	£1	47/6		25	25	10 10 6	47/6	42/-
Switchgear & Cowans	5/-	9/6	+3d	25	25	—	15/6	9/6
Taylor Tunnicliff	5/-	12/3		15	15	6 2 6	13/9	11/9
T.C.C.	10/-	37/6		25	25	6 13 3	41/3	35/-
T.C. & M.	£1	21/6		8½	8½	7 18 3	31/-	23/6
Telephone Mfg.	5/-	5/3		10	10	9 10 6	8/-	5/3
Telephone Rentals	5/-	10/6		12½	12½	5 19 0	12/6	9/6
Thompson (John)	5/-	24/-		25	25	5 4 3	37/-	23/6
Thorn Elec.	5/-	20/-	−9d	15	17½	4 7 6	26/3	16/3
Thornycroft	£1	24/3		12½	12½	10 6 3	37/6	21/3
Tube Investments	£1	48/9	−2/6	13¾	15	6 3 0	70/-	51/3
Vactric	5/-	14/6		17½	25	8 12 6	23/9	12/9
Veritys	5/-	5/3		12½	12½	11 18 3	9/3	6/9
Walsall Conduits	4/-	12/-		20	20	6 13 3	15/-	11/-
Ward & Goldstone	5/-	24/-	−1/-	35	40	4 3 3*	29/-	18/6
Watford	2/-	5/6	−6d	25	25	9 1 9	6/9	5/9
Westinghouse	£1	36/3		18	10*	5 10 3	41/3	28/9
West, Allen	5/-	9/9	−3d	15	15	—	13/6	9/6
Wolf Electric	5/-	9/-		20	20	5 11 0*	13/9	8/9

Price Changes

Although prices of leading electrical equipment shares were rallied by the English Electric results, the effect amounted in most cases to a reduction of earlier declines, and few shares managed to show net improvement after a difficult week. G.E.C. were a further 1s 3d down on balance at 31s 3d, after being 30s 6d. A.E.I. were quoted officially 1s 3d lower at 47s 6d, but stood in the market a little above that figure at the beginning of this week. Crompton Parkinson and Reyrolle lost some ground. In the heavy engineering group, Babcock & Wilcox were unchanged at 43s 9d, after falling to 42s 6d, while the new shares (now fully paid) stood 1s higher. Clarke Chapman shed 5s to 135s, and Tube Investments 2s 6d to 48s 9d. Small losses were widespread, but Bylock Electric 1s shares were supported at about 3s 6d after the company's announcement of substantially increased earnings and the maintenance of the dividend at 33⅓ per cent on capital increased by a 50 per cent scrip issue.

International Combustion

The final dividend declaration and the preliminary statement of the annual results of International Combustion (Holdings) were good enough to earn for the 5s shares the distinction of a sharp rise in price on one of the flattest of recent days. The quotation finished the week 2s to the good at 22s. With a further expansion of about 40 per cent in the net earnings to £1·27 million (after tax of £1·53 million) the company is able to raise again the rate of the dividend, from a total of 22½ to 25 per cent, without distributing as much as one-third of the surplus available for dividend and reserves. The yield on the shares goes up to nearly 5⅔ per cent. Following the announcement of these results came news of the group's order for a boiler for the Central Electricity Generating Board's new Thorpe Marsh power station.

Westinghouse Brake Prospects

At the recently held meeting of the Westinghouse Brake & Signal Co., Capt. A. R. Nutting reviewed a year of successful progress and larger earnings, and was able also to give a good account of the outlook in the current year. Orders on hand ensured a very busy period, and included a high proportion for export. Costs were difficult to control, but the volume of work and economies could help to offset increases. Given normal working conditions, the chairman saw no reason why this year should not be at least as satisfactory as the one ended last September. In that period, the net group profit expanded from £711,000 to £826,000, and covered twice over the amount of the 10 per cent dividend paid. Having been well maintained lately at around 36s 3d, the £1 shares are on a yield basis of 5½ per cent.

REPORTS and DIVIDENDS

The English Electric Group has issued preliminary statements of its various companies for 1957.

The English Electric Co., Ltd., reports a group profit of £6,916,989, as compared with £6,735,195 for 1956, and after deducting £3,590,866 for taxation, and transferring £496,000 to reserve (taxation relief on capital allowances in excess of depreciation), the net balance is £2,951,285 (against £2,911,812). It is proposed to pay a final ordinary dividend of 10 per cent maintaining the distribution for the year at 14 per cent on increased capital.

Marconi's Wireless Telegraph Co., Ltd.—The group profit for 1957 amounted to £1,075,938 (against £945,918 for 1956), and after meeting all charges, including £547,083 for taxation, the net profit is £480,048 (against £490,102). General reserve receives £250,000 and the ordinary dividend for the year is maintained at 10 per cent on increased capital.

The Marconi International Marine Communication Co., Ltd.—A group profit of £622,892 is shown for 1957, as compared with £493,693 for the preceding year, and after meeting all charges, including £316,125 for taxation, the net balance is £240,767 (against £222,104). A sum of £150,000 is placed to general reserve, and the proposed final ordinary dividend is 6 per cent, again making 10 per cent for the year.

D. Napier & Son, Ltd.—The profit for the year is £261,327, as compared with £247,866 for 1956, and the net balance, after all charges (taxation £170,000), is £91,327 (against £84,866). The proposed dividend for the year on the £1,546,000 ordinary stock is 7½ per cent (against 10 per cent on £546,000 ordinary capital).

Vulcan Foundry, Ltd.—A group loss of £286,497 is reported for 1957, as compared with a profit of £139,469 for 1956. Subvention payments from the English Electric Co., to cover losses for the year amount to £335,000, and after deducting taxation of £2,000 and placing £20,000 to general reserve, the net balance is £26,503 (against £44,807). No dividend is proposed on the ordinary stock for the year (against 10 per cent).

Hilger & Watts, Ltd., report a group profit for the year ended 30th September last of £181,062, as compared with £123,479 for the preceding year. Taxation absorbs £93,372, and the net profit is £87,690 (against £51,582), of which £85,893 is attributable to the parent company. It is proposed to pay a final ordinary dividend of 10 per cent (against 7 per cent), making 13 per cent for the year (10 per cent). The interim dividend of 3 per cent paid in 1955-56 was on smaller capital. General reserve receives £50,000 and the balance carried forward is £155,743 (against £151,150 brought in).

Babcock & Wilcox, Ltd.—Applications for the £2,000,000 of 6 per cent debenture stock 1980-83 amounted to over £43 million. For applications up to £100, allotment has been made in full. Applicants for £200 up to £2,500 have been allotted £100 each. Over £2,500 the allotment is approximately 4 per cent.

Acceptances have been received for approximately 95½ per cent of the 1,881,099 £1 ordinary shares which were offered to stockholders by way of rights at par.

International Combustion (Holdings), Ltd., reports group profits for the year ended 30th September last of £2,801,201, as compared with £2,095,894 for the preceding year. Taxation charged amounts to £1,526,456, and the net profit is £1,274,745 (against £913,414). Reserves receive £650,000, and it is proposed to pay a final dividend of 17½ per cent (against 15 per cent), making 25 per cent (22½ per cent) for the year.

Bylock Electric, Ltd.—The group profit for the year ended 31st July last amounted to £132,051, as compared with £78,807 for 1955-56. Taxation absorbs £75,139, and it is proposed to pay a dividend for the year on the ordinary and "A" ordinary of 33⅓ per cent (unchanged), on capital increased by a scrip issue of one-for-two.

The Direct Spanish Telegraph Co., Ltd., reports a profit for 1957 of £6,487, as compared with £6,178 for 1956. Taxation absorbed £5,281. General reserve receives £1,500, and the dividend for the year is maintained at 8 per cent.

The George Cohen 600 Group, Ltd., has declared an interim dividend of 4½ per cent (against 3½ per cent). The directors state that the increase must not be taken as signifying an increase in the year's total.

Crabtree Electrical Industries, Ltd., has announced an interim dividend of 7½ per cent (unchanged).

International Combustion Africa, Ltd., proposes to pay a final ordinary dividend of 35 per cent.

New Companies

Merlin Electrics, Ltd.—Registered 7th February. Capital £100. Electrical equipment specialists, etc. Directors: J. Bedford and Evelyn Bedford. Regd. office: 6, New Street, Aston, Birmingham.

D K Marine Electrical Co., Ltd.—Registered 11th February. Capital £100. Directors: J. R. W. Day-King and C. J. Saunders. Regd. office: 4, The Mount, Mavelstone Road, Bromley, Kent.

J. T. Podmore, Ltd.—Registered 10th February. Capital £3,000. Manufacturers of and dealers in television and radio receivers, etc. Directors: J. T. Podmore and Maud Podmore. Regd. office: 32, Waterloo Road, Burslem, Stoke-on-Trent.

Feedback, Ltd.—Registered 11th February. Capital £2,020. Electrical and mechanical engineers, manufacturers of and dealers in electronic, nucleonic, testing and measuring equipment, etc. Solicitors: W. Harold Hodson & Lines, Rugby.

Western Electronics, Ltd.—Registered 7th February. Capital £500. Manufacturers of and dealers in wireless and television sets, etc. Directors: J. R. Ashley (managing director) and B. L. Ashley. Regd. office: 60, Frome Road, Radstock, nr. Bath.

Kinetrol, Ltd.—Registered 10th February. Capital £10,000. Manufacturers of and dealers in automatic control and automation equipment, etc. Solicitors: Stafford Clark & Co., 3, Laurence Pountney Hill, E.C.4.

Celestion, Ltd.—Registered 7th February. Capital £100. Manufacturers of and dealers in electro-acoustical, acoustical, and sound-producing articles, apparatus and equipment, television, electrical and wireless apparatus, etc. Solicitors: Kenneth Brown, Baker, Baker, Essex House, Essex Street, W.C.2.

Woodvale Engineering Co., Ltd.—Registered 7th February. Capital £100. Manufacturers and repairers of and dealers in switchgear of all kinds, dynamos, motors, armatures, etc. Directors: J. E. Norton and H. J. Goodman. Regd. office: 54, Mosley Street, Manchester, 2.

Modern Aids, Ltd.—Registered 6th February. Capital £2,000. Manufacturers of and dealers in electrical appliances, goods and equipment of all kinds, etc. Directors: B. W. Tattersall, L. J. White and F. Riley. Regd. office: 1a, Great Portwood Street, Stockport.

Ashley Wholesalers (Southampton), Ltd.—Registered 10th February. Capital £100. Electricians, mechanical engineers, manufacturers of and dealers in electrical goods and apparatus, etc. Directors: L. F. Graham and Ethel A. J. Graham. Regd. office: 117, Park Road, Southampton.

Increases of Capital

Acme Electric Co. (Finsbury), Ltd.—Increased by £6,500, in £1 shares, beyond the registered capital of £1,000.

R. F. Webb, Ltd.—Increased by £10,000, in £1 ordinary shares, beyond the registered capital of £10,000.

Winding-up Order

Lukalux Electrical Appliances, Ltd.—Winding-up order made 3rd February on a petition presented on 16th January.

Liquidation

Samlad, Ltd., manufacturing mechanical and electrical engineers and precision tool makers. Hanover House, 73-78, High Holborn, London, W.C.1.—Winding up voluntarily as a members' voluntary winding-up. Liquidator, Mr. F. L. Webb, Hanover House, 73-78, High Holborn, W.C.1, appointed 4th February. Particulars of claims to the liquidator by 7th March. This notice is purely formal. All known creditors have been, or will be, paid in full.

Bankruptcies

L. Stanyer, electrical and fancy goods retailer and woodware manufacturer, 7a and 552, Dudley Road, Wolverhampton.—Receiving order made 3rd February on debtor's own petition. Public examination 2nd April at the Court House, Queen Street, Wolverhampton.

H. S. Page, 109, Market Street, Westhoughton, Lancs, radio, electrical and toy retailer.—Second and final dividend of 1s 9¾d in the £, payable at the offices of the Trustee, 47, Mosley Street, Manchester, 2.

S. W. Morley, carrying on business as Morleys at Bow Street, Rugeley, Staffs, as a radio and electrical engineer.—Order made 10th January granting bankrupt's discharge subject to his consenting to judgment being entered against him in the Stafford County Court by the Official Receiver for the sum of £125 being part of the balance of the debts provable in the bankruptcy which was not satisfied at the date of the order, and for £1 10s costs of judgment.

Inquiry into North Wales Nuclear Power Scheme

DEMONSTRATIONS by local residents in favour of the scheme marked the opening last week of the public inquiry into the Central Electricity Generating Board's plan to build a £50 million nuclear power station at Trawsfynydd, Merioneth. Banners across the street carried such messages as "Power Lines Not Lines of Unemployed" and "Pylons Before Poverty." The inquiry was conducted by Mr. H. W. Grimmitt, chief engineering inspector of the Ministry of Power, and Mr. C. D. Buchanan, a principal inspector of the Ministry of Housing and Local Government.

The site of the proposed station covers 180 to 190 acres on the north shore of the Trawsfynydd artificial lake, part of the Maentwrog hydro-electric scheme, and is within the Snowdonia National Park. The principal objectors were the North Wales (Hydro-Electricity) Protection Committee and the National Parks Commission. The Council for the Preservation of Rural Wales gave evidence but did not object to the project.

On the opening day Mr. S. B. Cooke, for the C.E.G.B., gave details of the station which, he said, would have a capacity of between 400 and 500 MW. It would draw 35 million gallons of cooling water an hour from the lake. There was no danger whatever of explosion and in fact the station would be less dangerous than many types of industrial plant. There might be a slight temporary increase in the radioactivity of the area but this would not be a danger unless people were exposed to it for a very long time. The construction period would be five or six years and the peak labour force 2,000 to 3,000, with a permanent establishment of about 300. In addition, the scheme involved 48 miles of overhead transmission from Connah's Quay, Flintshire, and 4½ miles of line from Trawsfynydd to Tanygrisiau; the latter would be needed in any event for the pumped storage scheme.

Mr. D. Clark (planning and construction engineer, C.E.G.B.) gave evidence of the suitability of the site and said that most meticulous attention would be given to the station's appearance. Cross-examined, he said that Trawsfynydd and Edeyrn were the only two suitable sites in North Wales. He agreed that the life of a nuclear power station for accounting purposes was assessed at a little more than 20 years. This point was pursued on the second day in questions put to Mr. F. R. Farmer, safety officer to the United Kingdom Atomic Energy Authority, who stated that, until after 10 or 15 years, one could not say if the final life would be 20, 30 or 40 years. Asked if it would be possible to renew the plant inside the building, he said it might be extremely difficult to carry out modifications. He replied "Yes" when asked if he anticipated that it would be so costly to demolish the plant that the reactors would be simply abandoned.

Mr. D. W. Jones Williams, clerk to Merioneth County Council, told the inquiry that the whole county welcomed the plan. Preservationists must rid themselves of the idea that no change must ever take place in the National Parks, he said. There could be no greater disfigurement than derelict villages and deserted towns.

Mr. C. J. Tuck, county planning officer, thought a nuclear power station was an ideal form of industry for the area. Professor J. S. Allan, consultant to the Joint Advisory Committee of the Snowdonia National Park, considered that the situation should be a challenge to twentieth century designers to prove their skill in developing contemporary landscapes.

On Friday, the last day of the inquiry, Lord Strang, chairman of the National Parks Commission, gave evidence. He thought that at the very least there was a strong presumption against the erection of such large-scale industrial buildings in a national park and that the only way in which that presumption would be rebutted was by demonstrating that the choice of site was in the overriding national interest and that there was no other site available. Mr. John Dower, deputy chairman of the Commission, considered that the buildings must appear as utterly out of scale and character with the landscape around it. Similar views were expressed by Col. G. Haythornthwaite, acting chairman of the North Wales Protection Committee, and Mr. Bodfan Griffith, landscape architect. Mr. S. Price, for the Protection Committee, thought that if the station were to be built it should be partly sunk into the rock.

AUTOMATIC TECHNIQUES IN INDUSTRY

MANUFACTURERS and large employers of clerical labour, such as banks, insurance companies, the Civil Service and local government, are planning a big increase in the use of automation equipment during the next five years. This is indicated by the replies to a questionnaire sent out by the Board of Trade towards the end of 1956, a preliminary analysis of which was made in an article in last week's *Board of Trade Journal*.

The main reasons advanced for the adoption of automatic techniques for production processes were reduced costs and increased output, and most firms also hoped to reduce the labour content in their costs. Apart from a more efficient use of materials, the greater throughput would mean less capital tied up in stocks. In some cases automatic equipment was being installed to overcome local labour shortages, whereas in others the need was related to the meeting of overseas competition or to the quality and consistency of the product. The reasons for the adoption of electronic data processing equipment were usually increased speed and accuracy, with a reduction of labour costs.

Most of the equipment needed could be obtained in this country although there were difficulties and delays in obtaining specialised items. A number of engineering firms expected to design and construct their own automatic equipment, even where they were not normally concerned with its manufacture. Although delivery periods for computers were up to three years, some delay in their installation was usually necessary to allow office methods to be adapted to their use.

Few firms expected to have much difficulty in the provision of capital to cover their present plans. In industries already highly mechanised, the introduction of automatic control equipment might actually reduce capital expenditure. The banks expected that the proportion of capital employed on the adoption of automation in the office would not be large in relation to their total costs. On the other hand firms which had little experience of office mechanisation expected to find the introduction of a computer expensive.

The effect on the size of the labour force could not be assessed, but there would be fewer unskilled labourers and clerical staff and more skilled technicians. Most firms expected to find great difficulty in engaging enough suitable technical staff, especially design technicians and engineers trained in electronics and servo-mechanisms. Usually only large firms complained of a shortage of graduate engineers. There was almost universal agreement that there would be a grave shortage of programmers. Manufacturers of control equipment and computers forecast five or sixfold increases in production in the next five years, and in the same period the machine tool and mechanical handling equipment industries expected to double their output. There were, however, complaints of shortages of steel plates and sections, stainless and alloy steels and electronic components.

NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (3s 6d each including postage) will be obtainable after 26th February from the Patent Office, 25, Southampton Buildings, London, W.C.2

1953

4473. Postmaster General.—Pulse generators. 3rd March, 1954. (791272.)

10112. Atkinson, W. O.—Stanchions, beams, roof girders, masts, electric transmission towers and like supports. 8th April, 1954. (Addition to 698794.) (791161.)

18701. Alkan, Ltd., M. L., and Morley, C. W. J.—Barrels for treating articles electrolytically. 6th July, 1954. (791231.)

1954

7850. Hutchings, E. L.—Electric lampholders. 20th June, 1955. (791111.)

8190. Vogt, H.—Alkaline storage batteries. 19th March, 1954. (791075.)

14094. Ferguson Radio Corporation, Ltd.—Electric circuits for use in sound reproduction. 13th May, 1955. (791335.)

16209. British Thomson-Houston Co., Ltd.—Electric winder control systems. 16th May, 1955. (791076.)

17992. British Thomson-Houston Co., Ltd.—Electric control of winder drives. 31st May, 1955. (791158.) 18894. Starting control of electric winders. 13th June, 1955. (791159.)

27439. Postmaster General.—Amplifiers and methods of detecting faults therein. 1st November, 1955. (791277.)

30838. Westinghouse Brake & Signal Co., Ltd., and Martin, R. G.—Electric regulating apparatus. 29th September, 1955. (791313.) 30839. Electric stabilising circuits suitable for use in servo systems. 7th October, 1955. (791314.)

35251. Pye, Ltd.—Telephone answering machines. 6th December, 1955. (791122.)

36048. British Telecommunications Research, Ltd.—Electromagnetic switches for high frequency electric currents. 8th December, 1955. (791123.)

37047. Prentice, Ltd.—Enclosed electric switches and switch units. 22nd December, 1955. (791337.)

37680. General Electric Co.—Bridge circuits particularly for stabilising a.c. voltages. 30th December, 1954. (791236.)

1955

1213. Licentia Patent-Verwaltungs-Ges.—Remote control system comprising electric signal receivers. 14th January, 1955. (791237.)

1898. General Electric Co., Ltd.—Lighting fittings. 12th January, 1956. (791128.)

2905. Electric & Musical Industries, Ltd.—Sound reproducing apparatus for use in mobile vehicles. 1st February, 1956. (791129.)

4361. Postmaster General.—Grapnels for recovering submarine cables. 14th May, 1956. (791130.)

5589. General Electric Co., Ltd.—Tanks for electrical apparatus. 23rd February, 1956. (791238.)

7086. Metropolitan-Vickers Electrical Co., Ltd.—Radiant heaters. 5th March, 1956. (791132.)

8504. Alkaline Batteries, Ltd.—Miners' cap lamps and like lamps using electric accumulators. 11th May, 1956. (791289.)

10899. Pye, Ltd.—Composite deflector and focus coil assemblies for controlling an electron beam. 29th March, 1956. (791134.)

11886. General Electric Co., Ltd.—Manufacture of shaped articles of synthetic resin, especially refractor panels for lighting fittings. 12th March, 1956. (791135.)

13537. British Thomson-Houston Co., Ltd.—Arrangement for constraining the motion of a resiliently mounted device. 8th May, 1956. (791342.)

15131. Elliott Bros. (London), Ltd.—Pulse generators. 25th May, 1956. (791293.)

16090. Automatic Telephone & Electric Co., Ltd.—Electrical signalling systems. 14th May, 1956. (791346.)

16262. Siemens & Halske Akt.-Ges.—Keyboard perforators for perforating teleprinter tapes. 6th June, 1955. (791245.)

17022. British Oxygen Co., Ltd.—Electric arc welding. 6th June, 1956. (791347.)

18200. Philips Electrical Industries, Ltd.—Electrical resistors. 23rd June, 1955. (791167.)

19157. British Thomson-Houston Co.—Control of electric winder equipment. 26th June, 1956. (791214.)

19264. Busch-Jaeger Dürener Metallwerke Akt.-Ges.—Waterproof electric switch. 4th July, 1955. (791348.)

20749. Moll, P. J.—Electric batteries. 18th July, 1955. (791139.)

21008. Philips Electrical Industries, Ltd.—Electromagnetic telephones. 20th July, 1955. (791295.)

23992. Farbenfabriken Bayer Akt.-Ges.—Electrical insulating foils and method of producing same. 19th August, 1955. (791296.)

24593. General Electric Co.—Electrical pulse forming networks. 26th August, 1955. (791251.)

26200. Oster Manufacturing Co., J.—Speed control device for electrically-driven machines. 13th September, 1955. (791172.)

26354. British Insulated Callender's (Submarine Cables), Ltd.—Apparatus for heat-treating cables and other elongated bodies. 14th September, 1956. (791091.)

27434. Bosch Ges., R.—Baking ovens having electrically ignited gas burners. 27th September, 1955. (791253.)

27442. Standard Telephones & Cables, Ltd.—Electric signalling systems. 27th September, 1955. (791216.)

34272. Fernseh Ges.—Electron multipliers. 30th November, 1955. (791301.)

36122. General Electric Co.—Vacuum cleaners. 16th December, 1955. (Addition to 748330.) (791221.)

1956

446. Elesta, Ltd.—Electronic time delay relays. 5th January, 1956. (791305.)

4263. Standard Telephones & Cables, Ltd.—Electrical computer. 10th February, 1956. (791156.)

4768. Baermann, M.—Electrical large-angle measuring instruments. 15th February, 1956. (791306.)

5236. Union Carbide Corporation.—A.c. arc welding process. 20th February, 1956. (Addition to 709533.) (791176.)

6210. Hughes Aircraft Co.—Magnetic transducer and housing. 28th February, 1956. (791178.)

8462. Hart Manufacturing Co.—Electric switch with rockable contact member. 19th March, 1956. (791307.)

9328. Telefunken Ges.—Very high frequency transmission systems. 26th March, 1956. (791185.)

10941. Eitel-McCullough, Inc.—Electron tubes. 10th April, 1956. (Addition to 782101.) (791363.)

16427. Standard Telephones & Cables, Ltd. (International Telephone & Telegraph Corporation).—Transistor limiter amplifier. 28th May, 1956. (791195.)

16475. Compagnie Industrielle des Telephones.—Magnetostatic relays. 28th May, 1956. (791372.)

16569. Eitel-McCullough, Inc.—Electron tube. 29th May, 1956. (791373.)

17793. Philips Electrical Industries, Ltd.—Safety circuit arrangements for multiplier tubes. 8th June, 1956. (791375.)

18823. Kenrick, G.—Earthing clamp for use in electric welding. 18th June, 1956. (791377.)

19280. Landis & Gyr Akt.-Ges.—Bottom bearing for sensitive measuring instruments, more especially for electricity meters. 21st June, 1956. (791200.)

23474. General Electric Co.—Insulation of electrical apparatus by a gaseous dielectric. 30th July, 1956. (791205.)

28166. Aktiebolaget Tudor.—Electric accumulator plates. 14th September, 1955. (791108.)

33807. Standard Telephones & Cables, Ltd.—Electrical digital computers. 10th February, 1956. (Divided out of 791156.) (791157.)

34860. Soc. Anon. pour l'Industrie de l'Aluminium.—Aluminium foil for electrolytic condensers. 14th November, 1956. (791380.)

STREET LIGHTING NOTES

Billingham-on-Tees U.D.C. is to borrow £4,700 for electric lighting in connection with the Tees Salt Bridge improvement scheme.

Boldon (Co. Durham) U.D.C. has received loan sanction for £7,800 for the lighting of main roads. The Council's surveyor (Mr. J. T. Edmondson) has also prepared a list of secondary roads where improved lighting is needed.

Hebburn (Co. Durham) U.D.C. is seeking sanction to borrow £10,054 for street lighting improvements.

Chippenham Corporation is recommended to approve a scheme, estimated to cost £2,420, for the provision of 36 mercury vapour lamps in Hardenhuish Road.

After hearing a report by the surveyor on the costs of gas and electric street lighting, **Prudhoe (Northumberland)** U.D.C. has decided to change over to electricity as soon as possible.

Gas lighting in Lower Hipper Street, **Chesterfield** is to be converted to electricity and fluorescent lighting installed on the Dunstan Lane estate.

Cleethorpes Town Council is to improve the lighting in Grimsby Road (£5,138).

Street lighting improvements costing some £3,000 are to be carried out in their area by **Doncaster** R.D.C.

If Ministry of Transport approval is received, **Prestatyn** U.D.C. plans to convert certain street lamps from gas to electricity at an estimated cost of £12,780.

Tottenham Highways and Works Committee reports that schemes have now been prepared for lighting improvements to the trunk road section of the Great Cambridge Road and the Roundway (East), the county road sections of the Roundway (West) and Downhills Way and the classified road Westbury Avenue. The estimated cost is £12,200.

Edinburgh Works Committee is including £131,000 for capital expenditure on street lighting in its estimates for 1958-59. A further sum of £21,250 is provided for improvements and reconstruction of stair lighting, mainly conversion from gas to electricity.

During 1958-59 **Redcar** Town Council is to spend another £5,350 on converting street lighting from gas to electricity.

Scarborough Town Council has received £7,320 loan sanction for electric street lighting in various roads at present lit by gas.

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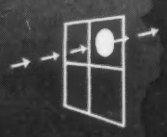

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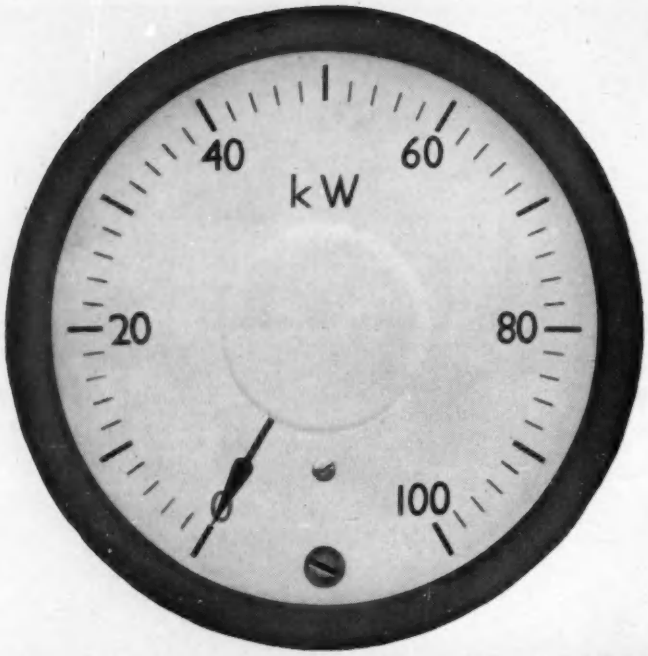

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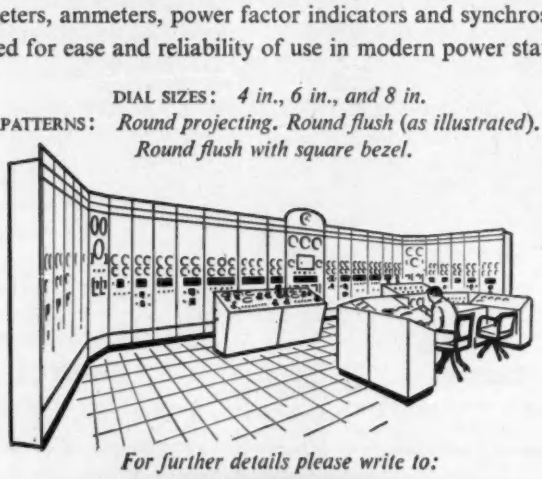

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NEXT WEEK'S EVENTS

Organisers of electrical functions are advised to make use of the "Electrical Review" clearing house, Room 221, Dorset House, Stamford Street, London, S.E.1, to ascertain that proposed dates for their functions do not clash with others already arranged.

Monday, 24th February

BIRMINGHAM.—James Watt Memorial Institute, Great Charles Street, 6 p.m. I.E.E. South Midland Radio and Measurements Group. "Radio Research and the International Geophysical Year," by Dr. R. L. Smith-Rose.

CARDIFF.—At the South Wales Institute of Engineers, 6 p.m. I.E.E. Western Utilisation Group. "Temperature Rises in Electrical Machines as related to the Properties of Thermal Networks" and "Temperature Rises in Electrical Machines on Variable Load and with Variable Speed," by Professor A. Tustin and Dr. J. J. Bates.

LEEDS.—Lighting Service Bureau, 24, Aire Street, 6.15 p.m. I.E.S. Leeds Branch. "Photo-electric Cells and their Applications," by Dr. F. A. Benson.

LEICESTER.—Demonstration Theatre, East Midlands Electricity Board, Charles Street, 7 p.m. I.E.S. Leicester Centre. Street Lighting Forum.

LONDON.—Savoy Place, W.C.2, 5.30 p.m. I.E.E. Radio and Telecommunication Section. "Stereophonic Recording on Gramophone Discs," by H. A. M. Clark.

NEWCASTLE-UPON-TYNE. — Neville Hall, 6.15 p.m. I.E.E. North Eastern Centre. "Design and Application of Large Solid Rotor Asynchronous Generators," by P. Richardson.

Tuesday, 25th February

BIRMINGHAM. — College of Technology, Gosta Green. Institute of Metals, Metal Physics Committee. One-day symposium on "Metallurgical Aspects of Semi-Conductors."

CAMBRIDGE. — Physiological Laboratory, 8 p.m. I.E.E. Cambridge Radio and Telecommunication Group. "The Eye as a Television Camera," by Dr. F. W. Campbell.

CARDIFF.—Angel Hotel, Westgate Street, 7.30 p.m. A.S.E.E. South Wales Branch. "Overhead Wiring Practice."

At the South Wales Engineers' Institute, Park Place, 7.15 p.m. Incorporated Plant Engineers, South Wales Branch. "Instrumentation," by J. M. Keating.

GALASHIELS.—I.E.E. South East Scotland Sub-Centre. District meeting. "Sparks and Arcs," by Professor F. M. Bruce.

HULL.—Y.E.B., Ferensway, 6.30 p.m. I.E.S. Leeds Centre. "Photo-electric Cells and their Applications," by Dr. F. A. Benson.

LEEDS.—C.E.G.B. Offices, 1, Whitehall Road, 7 p.m. I.E.E. North Midland Graduate and Student Section. Students' lecture. "Man/Machine Relationships," by W. H. Dunkley.

LONDON.—At the Institution of Electrical Engineers, Savoy Place, W.C.2, 6.30 p.m. A.S.E.E. London National Lecture. "Prevention of Accidents; The Responsibility of the Supervising Engineer," by P. W. Cole.

At the Royal Society of Arts, John Adam Street, Adelphi, Strand, W.C.2, 7 p.m. Incorporated Plant Engineers, London Branch. Annual general meeting.

LUTON.—Staff Canteen, D. Napier & Son, The Airport, 6 p.m. I.E.E. London Graduate and Student Section. District meeting. Film evening.

MANCHESTER.—Engineers' Club, Albert Square, 6.15 p.m. I.E.E. North Western Supply Group. "A Method of Analysis of Transformer Impulse Voltage Distribution using a Digital Computer," by Beryl M. Dent, E. R. Hartill and J. G. Miles.

Lecture Theatre, Gas Board's Showrooms, Town Hall Extension, 7.15 p.m. Ministry of Works, Manchester Branch. "Small Heating and Ventilating Installations," by E. W. Herrington.

RUGBY.—Technical College, 6.30 p.m. I.E.E. Rugby Sub-Centre. "The Importance of Research in Hearing and Seeing to the Future of Telecommunication Engineering," by Dr. E. C. Cherry.

Wednesday, 26th February

CARDIFF. — Park Hotel, and Whitehall Rooms. Combustion Engineering Association, Welsh Region. 10 a.m. "Recent Advances in Space Heating," by G. H. Buckle. 2.30 p.m. "Refractories for the Industrial Boiler and Furnace," by N. W. Hinchcliffe.

HOVE.—New Imperial Hotel, 7.30 p.m. A.S.E.E. Brighton, Hove and District Branch. "Electric Floor Warming in the All-Electric House," by G. R. Lomax.

LONDON.—Savoy Place, W.C.2, 5.30 p.m. I.E.E. Supply Section. "Design and Application of Large Solid-Rotor Asynchronous Generators," by P. Richardson.

I.E.E. London Graduate and Student Section, 8.30 p.m. Visit to the Times Publishing Co., Ltd.

At the London School of Hygiene and Tropical Medicine, Keppel Street, W.C.1, 6.30 p.m. British Institution of Radio Engineers. "Dectra: A Long Range Navigational Aid," by C. Powell.

C.E.G.B. Headquarters, Winsley Street, W.1, 6.45 p.m. Women's Engineering Society, London Branch. "Three Case Studies in Automation," by G. Denton.

NOTTINGHAM.—East Midlands Electricity Board Showroom Theatre, Smithy Row, 7.30 p.m. A.S.E.E. Nottingham Branch. "The Petroleum Industry and the Future," by J. Collins.

PORTSMOUTH.—C.E.G.B. Offices, 6.30 p.m. I.E.E. Southern Centre. "Route Selection and Cable Laying for the Transatlantic Cable System," by R. J. Halsey.

PRESTON. — Harris College, Corporation Street, 7 p.m. Ministry of Works, Preston Branch. "Small Heating and Ventilating Installations," by E. W. Herrington.

TREFOREST.—Glamorgan Technical College, 6.30 p.m. British Institution of Radio Engineers, South Wales Section. "Industrial Television," by R. Swinden and J. E. H. Brace.

Thursday, 27th February

CROYDON.—Greyhound Hotel, High Street, 8 p.m. A.S.E.E. South London Branch. "Artificial Three Phase."

HULL.—Yorkshire Electricity Board, Ferensway, 6.30 p.m. I.E.E. North Midland Centre. "British Columbia-Vancouver Island 138 kV Submarine Power Cable," by Dr. T. Ingledow, R. M. Fairfield, E. L. Davey, K. S. Brazier and J. N. Gibson.

LONDON.—Grosvenor House, Park Lane, W.1, 7 for 7.30 p.m. Institution of Electrical Engineers. Annual dinner.

University of London Institute of Education, Malet Street, 7 p.m. Institution of Electronics. "Germanium Transistors, Their Principles and Manufacture," by C. H. Gardner.

Connaught Rooms, W.C.2, 12.30 for 12.55 p.m. Batti-Wallahs' Society. Luncheon. Guest speaker, Mrs. P. McLaughlin, M.P.

At the Institution of Civil Engineers. The Institution of the Rubber Industry and the Plastics Institute. Joint conference on "Recent Advances in Polymer Technology."

SHEFFIELD.—Grand Hotel, 7.30 p.m. Incorporated Plant Engineers, Sheffield and District Branch. "Atmospheric Pollution in Industry," by W. Herring.

Friday, 28th February

BIRMINGHAM.—Regent House, St. Philip's Place, Colmore Row, 6 p.m. I.E.S. Birmingham Centre. Annual meeting.

CHELTENHAM. — North Gloucestershire Technical College, 7 p.m. British Institution of Radio Engineers, South Midlands Section. "Some Advanced Application on Information Theory," by P. H. Blundell.

COVENTRY. — Craven Arms, 8.15 p.m. A.S.E.E. Coventry Branch. 1957 Electrical Engineers Exhibition film.

DERBY.—College of Art, 7 p.m. Institution of Production Engineers, Derby Section. "Nuclear Power and the Production Engineer," by I. Munro.

EDINBURGH. — Roxburghe Hotel. Incorporated Plant Engineers, Edinburgh Branch. Annual dinner.

HARROGATE.—Cairn Hydro, 7 for 7.30 p.m. E.I.B.A. West Yorkshire Area. Annual ball.

LIVERPOOL.—Mecca Sefton House. Incorporated Plant Engineers, Merseyside and North Wales Branch. Dinner and dance.

MANCHESTER.—The University, 6.45 p.m. Manchester Association of Engineers. "Brushless Variable Speed Induction Motors," by Professor F. C. Williams.

College of Science and Technology, 7 p.m. Institution of Electronics, Manchester Division, 7 p.m. "Silicon Junction Power Diodes," by Dr. D. F. Taylor.

Midland Hotel, 7.15 p.m. Institution of Production Engineers, North Western Region. Annual dinner.

NEWCASTLE-UPON-TYNE. — Grand Hotel, Barras Bridge, 6.30 p.m. I.E.E. North Eastern Graduate and Student Section. Problems night.

NOTTINGHAM.—Victoria Hotel, 7 p.m. I.E.E. East Midland Centre. Annual dinner.

WEYMOUTH.—South Dorset Technical College, 6.30 p.m. I.E.E. Southern Centre. "Colour Television," by C. J. Stubbington.

WIMBLEDON.—"Prince of Wales" Hotel, S.W.19. A.S.E.E. South West London Branch. Annual dinner.

Saturday, 1st March

BRADFORD.—A.S.E.E. Bradford Branch. Visit to Calder Hall.

TRADE MARKS

APPLICATIONS have been made for the registration of the following trade marks. Objections may be entered up to 28th February:—

OVENTROL. No. 760,626. Class 9. Thermostats, thermostatic valves and thermostatic regulators.—Robertshaw-Fulton Controls Co., Greensburgh, Penn., U.S.A. Address for service, c/o Frank B. Dehn & Co., Kingsway House, 103, Kingsway, London, W.C.2.

SIEMENS EDISWAN (design). No. B769,037. Class 9. Electrical apparatus and instruments, and parts.—Siemens Edison Swan, Ltd., Caxton House, Tothill Street, Westminster, London, S.W.1.

REGINA. No. B770,482. Class 9. Radio and television receivers.—Kolster-Brandes, Ltd., Cray Works, Sidcup, Kent.

AIRMASTER. No. B769,288. Class 9. Vacuum cleaners and vacuum dust extractors, all being electrically operated; and parts.—Columbus Sheet Metal Co., Ltd., Gordon Chambers, 21, Bond Street, Leeds, 1; and 38, Buslingthorpe Lane, Leeds, 7.

VAPOURSTAT. No. B770,538. Class 9. Electrical apparatus for automatically controlling the rate of evaporation of heated liquids.—Heating Equipment, Ltd., Hughenden Manor, Petersfinger, Salisbury, Wilts.

PHILIPS (design). No. 770,854. Class 9. Gramophone records and apparatus for recording and reproducing sounds by means of magnetic tapes, and parts.—Philips Electrical, Ltd., Century House, Shaftesbury Avenue, London, W.C.2.

JANET. No. 764,810. Class 11. Electrically heated clothes drying cabinets.—C. A. Shepherd, 54, Brown Street, Manchester, 2.

HALO (design). No. 770,500. Class 11. Heating elements for electric cookers and for electric water heaters.—Hotpoint Electric Appliance Co., Ltd., Crown House, Aldwych, London, W.C.2.

CONTRACT INFORMATION

Accepted Tenders and Prospective Electrical Work

CONTRACTS OPEN

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses

Australia.—Sydney County Council. 27th February. 400 11,000 V capacity fuses. (E.S.B. 3326/58. Ten/30795.)*

Electricity Commission of New South Wales, Sydney. 3rd March. Carrier telephone and signalling apparatus. (E.S.B. 3631/58. Ten/30937.)*

Australian Broadcasting Corporation. 20th March. Technical equipment for television studio centres. (E.S.B. 3363/58. Ten/30833.)*

Director of Stores and Contracts, Postmaster General's Department, Melbourne. 25th March. Paper insulated cable. (E.S.B. 3071/58. Ten/30800.)* Underground (trunk type) telephone cable. (E.S.B. 3072/58. Ten/30801.)*

Overseas Telecommunications Commission, New South Wales. 9th April. High frequency radio telegraph receivers. (E.S.B. 3451/58. Ten/30809.)*

Ayr.—County Council. Trunk road lighting equipment. (See this issue.)

Burma.—Burma Purchase Board, Rangoon. 27th February. Plugs and sockets. (E.S.B. 3494/58. Ten/30824.)* 3rd March. Inert cells. (E.S.B. 3796/58. Ten/30870.)* Electric motors. (E.S.B. 3794/58. Ten/30871.)*

Electricity Supply Board. 3rd March. Transformers. (E.S.B. 4145/58. Ten/30955.)*

Canada.—Manitoba Hydro-Electric Board, Winnipeg. 28th February. 115 kV disconnect switches. (E.S.B. 4196/58. Ten/30971.)* 25th March. Auto controls and instrumentation for Selkirk power station. (E.S.B. 3029/58. Ten/30791.)*

Formosa.—Central Trust of China, Taipei. 20th March. Transformers and meters. (E.S.B. 3869/58. Ten/30913.)* Electrical measuring and testing equipment, and transformer dryer. (E.S.B. 3870/58. Ten/30916.)* 11th March. Control panels, switchgear and storage batteries. (E.S.B. 3855/58.I.C.A. Ten/30902.)* 12th March. Capacitors. 25th March. Power circuit-breakers. (E.S.B. 3856/58.I.C.A. Ten/30901.)* 13th March. Oil circuit reclosers, fuse cut-outs, fuse links and automatic transfer oil switches. (E.S.B. 3858/58.I.C.A. Ten/30911.)* 15th March. Air break switches, disconnect switch, power fuses, load interrupter switch, and lightning arrestors. (E.S.B. 3862/58.I.C.A. Ten/30914.)* 19th March. Power line equipment. (E.S.B. 3868/58.I.C.A. Ten/30912.)* Insulators. (E.S.B. 3867/58.I.C.A. Ten/30910.)*

Holywell.—U.D.C. 7th March. Trunk road lighting equipment. (See this issue.)

Iraq.—Director General of Municipalities, Baghdad. 1st March. 1,000 kW generating set for Hillah Water and Electricity Board. (E.S.B. 3107/58. Ten 30778.)* Bare copper conductor. (E.S.B. 3904/58. Ten/30936.)*

Iraqi State Railways, Baghdad. 14th April. 2,000 kW oil engine generating set with switchgear and auxiliaries. (E.S.B. 3897/58. Ten/30898.)*

New Zealand.—Auckland Electric Power Board. 28th February. Insulated cable. (E.S.B. 3291/58. Ten/30789.)*

Christchurch Electricity Department. 18th March. Twenty-five 200 kVA transformers. (E.S.B. 2955/58. Ten/30776.)*

State Hydro-Electric Department, Wellington. Four 10,000 kVA transformer units. (E.S.B. 3715/58. (Ten/30867.)*

G.P.O., Wellington. 26th March. Switches, connectors, cuphooks, adaptors, plugs and sockets. (E.S.B. 3714/58. Ten/30856.)* 31st March. Telegraph transmitting paper tape. (E.S.B. 3836/58. Ten/30925.)*

Pakistan.—Posts and Telegraphs Department, Karachi. 1st March. Lamps for C.B. switchboards. (E.S.B. 4395/58. Ten/31000.)* 3rd March. Layer type carbon resistances. (E.S.B. 4396/58. Ten/30999.)*

Peru.—Ministerio de Fomento y Obras Públicas, Dirección de Industrias y Electricidad, Lima. 4th March. Equipment for Huacrachuco hydro-electric power station. (E.S.B. 3651/58. Ten/30978.)*

Rhodesia and Nyasaland.—Bulawayo Electricity Department. Single, three-core and multi-core cables and sealing ends. (E.S.B. 3585/58. Ten/30836.)*

Federal Power Board. Metering equipment and 18 and 11 kV and auxiliary cables and accessories for Kariba power station. (See this issue.)

Singapore.—Water Department. 3rd March. Standby generating plant. (E.S.B. 4056/58. Ten/30960.)*

South Africa.—Union Tender and Supplies Board, Pretoria. 27th February. Private automatic telephone exchange. (E.S.B. 3625/58. Ten/30858.)* 14th March. One 1,500 A 10 V and two 1,000 A 10 V chrome plating rectifier sets. (E.S.B. 3889/58. Ten/30897.)*

Stores Department, South African Railways, Johannesburg. 5th March. Electric cable for motor vehicles. (E.S.B. 3172/58. Ten/30777.)* 14th March. Switchgear and transformers. (E.S.B. 3890/58. Ten/30887.)*

Durban Electricity Department. 28th March. Four 15,000 kVA transformers. (E.S.B. 3668/58. Ten/30865.)*

Sudan.—Department of Posts and Telegraphs, Khartoum South. Telephone wires. (E.S.B. 3013/58. Ten/30703A.)* 8th March. Telephone line insulators. (E.S.B. 3880/58. Ten/30933.)*

Thailand.—Thai Technical and Economic Committee, Bangkok. 25th March. 15 kV switchgear. (E.S.B. 3749/58. Ten/30899.)*

United States.—Bureau of Reclamation, Denver. 27th February. Battery chargers, distribution boards and control cabinet for Green Springs power plant. (E.S.B. 3767/58. Ten/30907.)*

ORDERS PLACED

Acton.—Borough Council Works Committee. Recommended. Electric street lighting columns and lamps on classified roads in the borough (£40,244).—Revo Electric Co.

Barnsley.—Corporation. Electrical installation work in connection with the reconstruction of the sewage disposal works (£16,266).—W. T. Parker.

Birkenhead.—Corporation Education Committee. Recommended. Electrical installation at Woodchurch Secondary School for Boys (£6,256).—F. Hancock.

Coulsdon and Purley.—U.D.C. Recommended. Sodium street lighting installation, Brighton Road (£15,919).—G.E.C.

Lowestoft.—Corporation Housing Committee. Recommended. Installation of hot water systems in 288 pre-war Corporation houses (£12,010).—Eastern Electricity Board.

Newcastle-on-Tyne. — Regional Hospital Board. Electrical work in laundry block at Winterton Hospital, Sedgefield (£2,988).—T. Michelson (Electrical).

Sunderland.—Corporation. Street lighting, Ford estate (£6,952).—G.E.C.

WORK IN PROSPECT

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors

Blaydon (Co. Durham).—Depot and office block for J. Lyons & Co.; R. H. Sykes, architect, 141, Hammersmith Road, London, W.14.

Blyth.—Houses (66), Cowpen estate; D. W. Foster, borough engineer.

Bradford.—Store, Broadway, for C. & A. Modes; J. Gerrard & Sons, Ltd., builders, Swinton, Manchester.

Brighton.—Department store extension, London Road; J. Seymour Harris & Partners, architects, 4, Greenfield Crescent, Edgbaston, Birmingham.

Cardiff.—Houses (167), Pen-yr-Hoel; city architect.

Cheltenham.—Fire station, Keynsham Road/College Road site; county architect, Shire Hall, Gloucester.

Consett.—First instalment of technical college and public library; county architect, Durham.

Hayes and Harlington.—Houses (95), Barnhill estate; U.D.C. surveyor, Town Hall, Hayes, Middlesex.

Hebburn.—Houses (67), Blue House Farm estate; J. M. Black, Ltd., builders, Glen Street, Hebburn.

R.C. secondary/grammar school at Mill Lane; Gordon Durham & Co., builders, Moor Lane, East Boldon.

Houghton-le-Spring.—Houses (90); U.D.C. surveyor.

Howdon-on-Tyne.—Factory; Armstrong & Barks, Ltd., Quayside, Newcastle.

Littlebourne.—Dwellings (30), St. Vincent's Close; H. V. Godfrey, architect, 63, Oxford Street, Whitstable.

Llandudno.—R.C. primary school; Patrick & M. White, architects, Granville House, Arundel Street, London, W.C.2.

London.—Office block, 176/204, Marylebone Road; Sir Robert McAlpine & Son, Ltd., builders, 80, Park Lane, W.1.

Seven-storey offices in Blackfriars Road, S.E.; Kenneth Anns, architect, 1, Lincoln's Inn Fields, Holborn, W.C.2.

Loughborough.—De Lisle Roman Catholic Secondary Modern School at Thorpe Hill (£100,000); Nottingham Diocesan Education Council, Nottingham.

Lowestoft.—Factory extensions; Birds Eye Foods, Ltd., Whapload Road.

Malden and Coombe.—Girls' secondary school (£203,810); J. Harrison, county architect, County Hall, Kingston-on-Thames.

Newbury.—Houses (105), Bath Road, Camp Close and Enborne Road; borough engineer, Municipal Buildings.

Rochester.—Flats (228), Riverside estate; Peak Construction Co., Ltd., Knight Road, Strood.

St. Neots.—Electrical workshop, craftroom, drawing office, etc., at Technical Institute; S. Holloway, county architect, County Buildings, Huntingdon.

Sheffield.—Retail market, Exchange Street (£779,580); William Moss & Sons, Ltd., builders, Queens Road, Loughborough.

Walsall. — Maternity unit, Goscote; Birmingham Regional Hospital Board, 10, Augustus Road, Birmingham, 15.

York.—Houses (106) and family group home, Hamilton Drive, Acomb (£129,590); Sorrell (York), Ltd., builders, Hildreth House, Main Street, Heworth, York.

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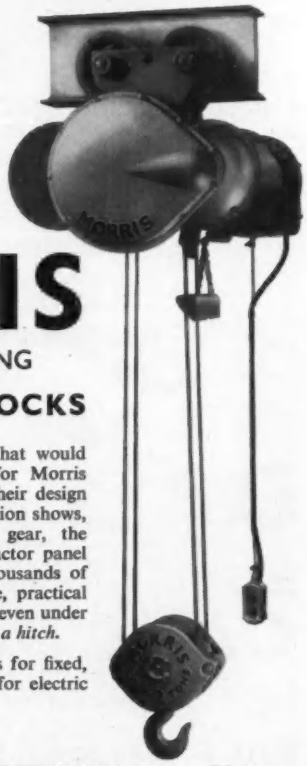
* Specifications may be inspected at the Export Services Branch, Board of Trade, Lacon House, Theobald's Road, London, W.C.1 (Chancery 4411; extension 769).

HOISTING WITHOUT A HITCH!



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INVEST IN A MORRIS
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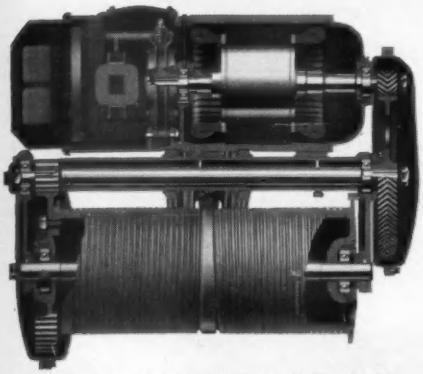

If there is one factor more than another that would account for the ever-increasing demand for Morris electric hoist-blocks, it is the simplicity of their design and construction. As our sectional illustration shows, the motor, the straightforward reduction gear, the drum, the powerful brake and robust contactor panel are supported by a welded steel frame. Thousands of users have already proved that this simple, practical arrangement results in dependable service even under adverse conditions—*in fact, hoisting without a hitch.*

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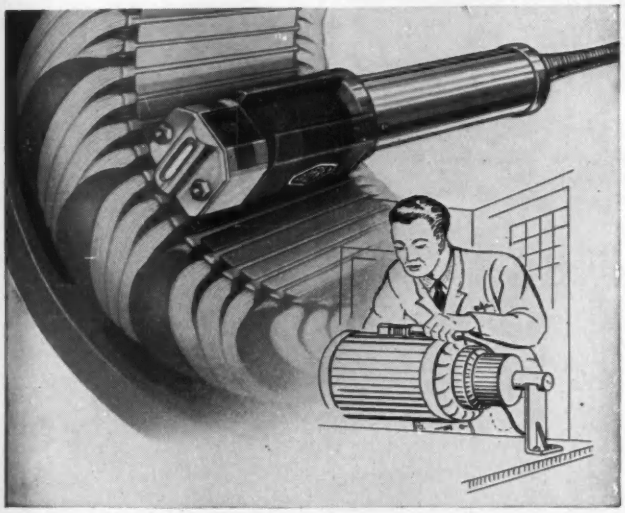

'Prufrex' A6 TESTER

A new sensitive universal fault finder.
Will test largest alternator or
smallest aircraft type motor.
Locates short circuit—open coil—
wrong connection.
Immediate delivery.

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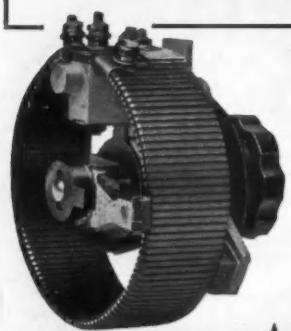
a range of extremely robust

ROTARY RHEOSTATS



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An extremely robust rheostat with a unique metal cored former (patent appd. for)

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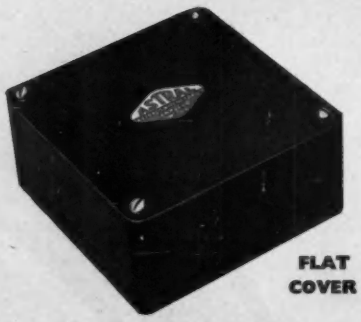
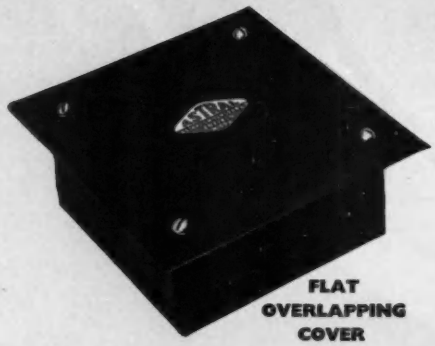
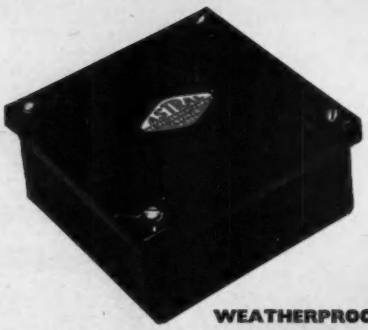


FLAT COVER



FLAT OVERLAPPING COVER



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RANGE Thirty-five sizes of 'Astral' Adaptable Boxes. For conduit installations, and to enclose controls, switches, relays, test racks, terminals etc. Of unique strength, quality and utility. For each size of 'Astral' Box, three types of Steel Covers, each secured by four corner screws.

USE OF BOX	TYPE OF COVER	GAUGE OF COVER
SURFACE	'FLAT'	AS OF BOX
FLUSH	'FLAT OVERLAPPING'	14 B.G.
SURFACE, OUTDOOR OR DUSTY ATM. ETC.	'WEATHERPROOF' (Rubber Gasket)	16 B.G.

FEATURES Reinforced corners. Smooth inner and outer walls, of uniform thickness, facilitating drilling, threading, bushing, and fixing of attachments. No knockouts or holes. For heavy duty and reliable service.

MATERIALS Two small Boxes diecast in LM6 aluminium alloy, 3″ x 3″ x 1½″ deep and 2″ deep. Thirty-three Boxes of formed sheet steel, 14 B.G. (0.078″) for 4″ x 4″ x 2″ deep to 6″ x 4″ x 4″ deep, and 12 B.G. (0.099″) for the larger Boxes up to 12″ x 12″ x 4″ deep.

FINISHES All 'Astral' Adaptable Boxes and Covers are supplied stove enamelled black. Alternatively, the Steel Boxes and Covers up to 6″ x 6″ x 4″ deep, can be supplied hot dip galvanized, and larger sizes zinc sprayed, or any size cadmium plated or Sherardized.

'ASTRAL' SERVICE Adaptable Box Publication No. 51, Dimensional Drawing M.5120, Price List and a Sample Box, will be sent with pleasure. Other 'Astral' Products include Fused Switchgear, Terminal Units, Switchboards etc. Your 'Astral' Technical Representative offers personal service.

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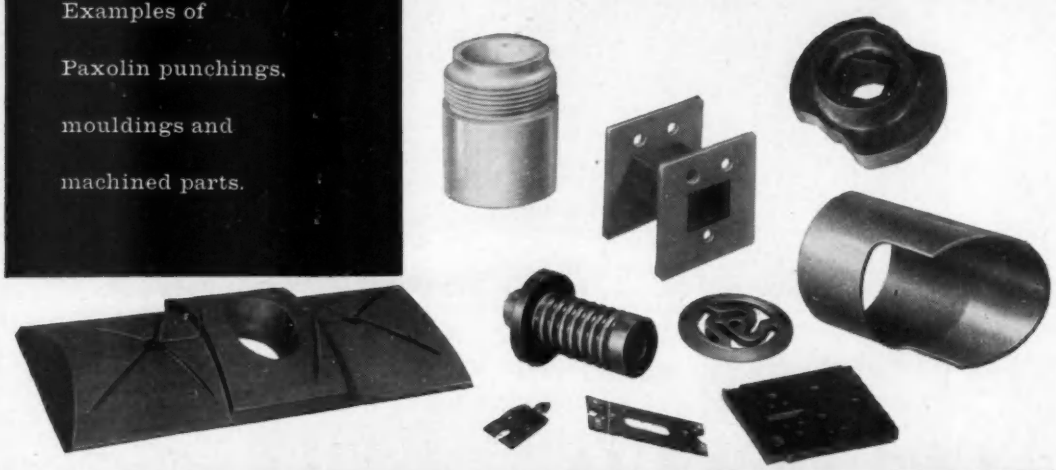

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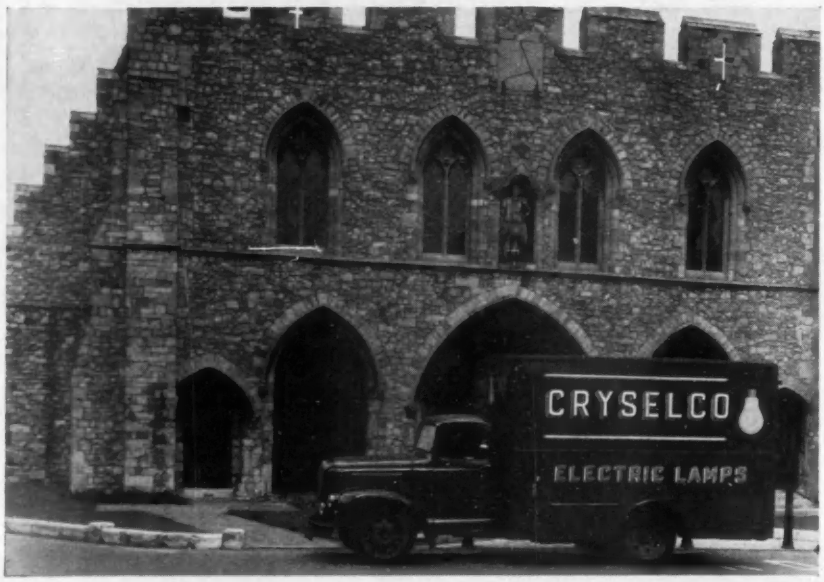

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Both these types of tariff encourage consumers to obtain maximum power from the current they buy. BICC Capacitors *ensure* that they do.

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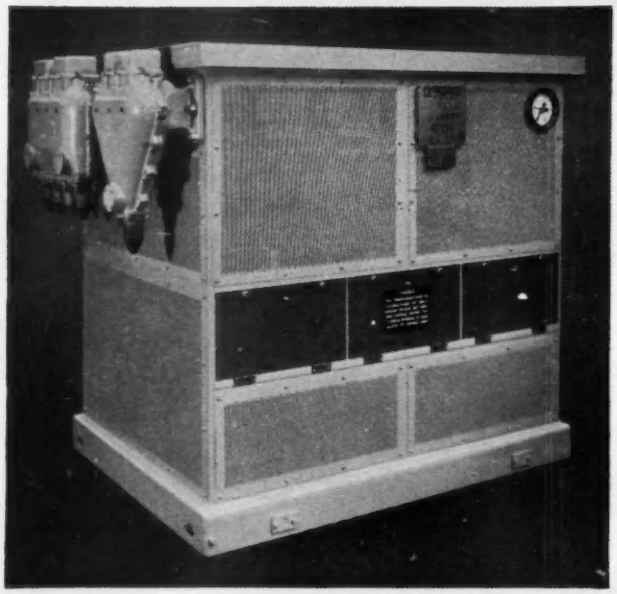
The benefits of silicone-insulated dry-type transformers are becoming better and better known:

* **No fire or explosion risk**
* **Reduced maintenance**
* **Frequent overloading permissible**
* **Smaller size and weight than O.N. or Class B units**
* **Dust, humidity and ventilation are no problem**
* **Can be placed at load centre, therefore making shorter low-voltage cable runs possible.**

The photograph below shows a 500kVA Ferranti dry-type, air-cooled distribution transformer with Class 'C' silicone insulation — B.S.2757 : 1956.



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Here is a list of well-known British manufacturers already producing silicone-insulated dry-type transformers for the United Kingdom and overseas. These transformers have already been installed in:

Steel mills · Car factories
Newspaper plants · Food factories
Flour mills · Coal mines
Underground sub-stations
Office buildings · Blocks of flats
Departmental stores
Radar and airfield sites

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GRESHAM TRANSFORMERS LTD.
HACKBRIDGE & HEWITTIC ELECTRIC CO. LTD.
LONDON TRANSFORMER PRODUCTS LTD.
METROPOLITAN-VICKERS ELECTRICAL CO. LTD.
BRUCE PEEBLES & CO. LTD.
SOUTH WALES SWITCHGEAR LTD.
WODEN TRANSFORMER CO. LTD.

Midland Silicones Limited manufacture in Great Britain the full range of silicone resins and elastomers used by transformer manufacturers in the construction of silicone-insulated dry-type units.

MIDLAND SILICONES LTD

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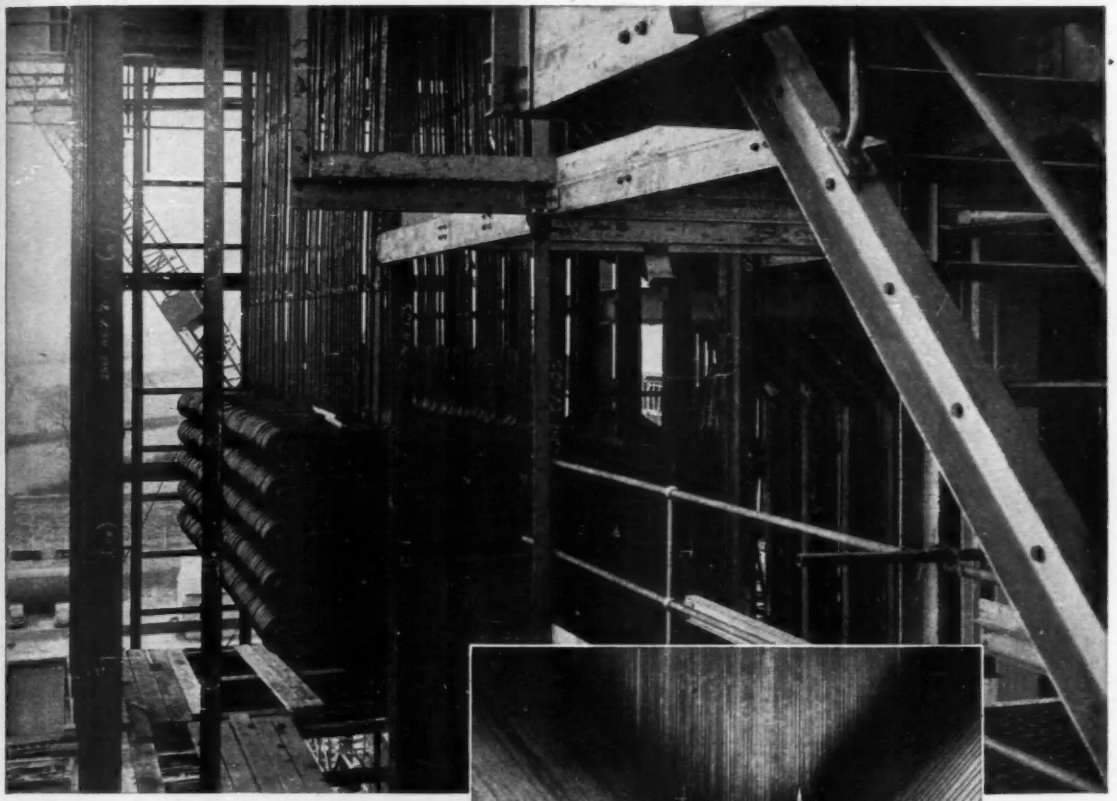

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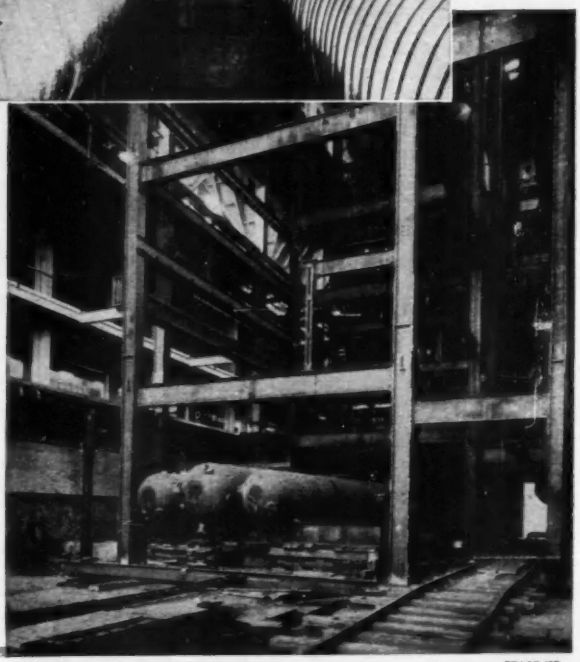

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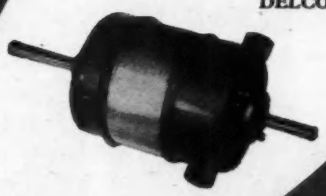

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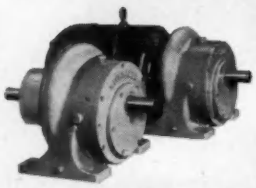

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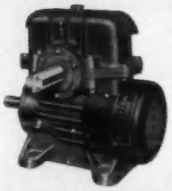

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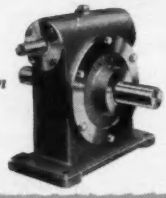

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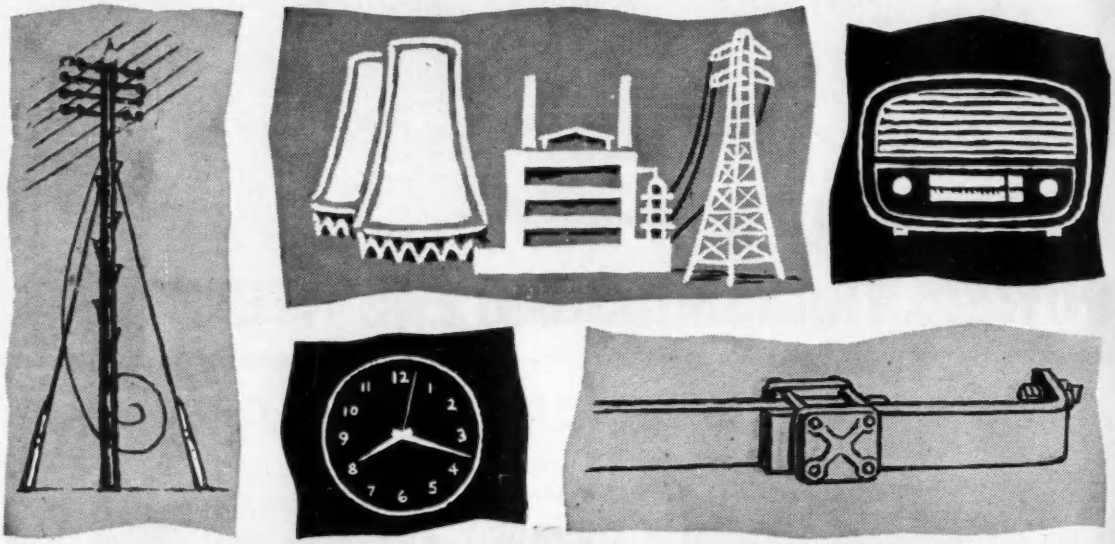

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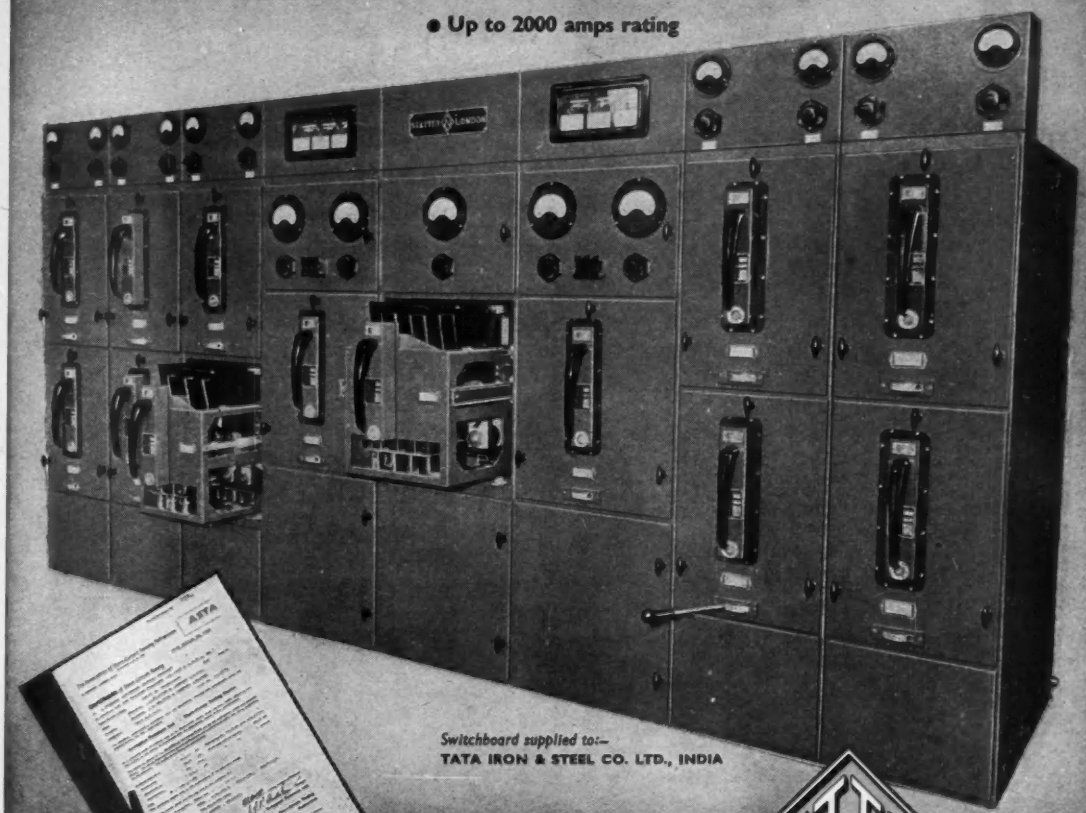

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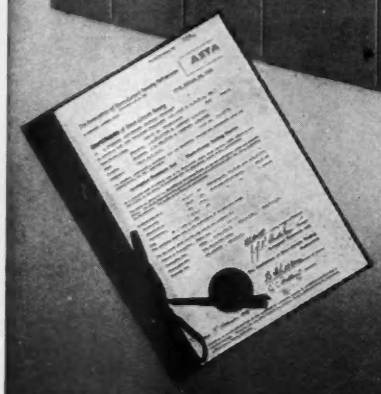

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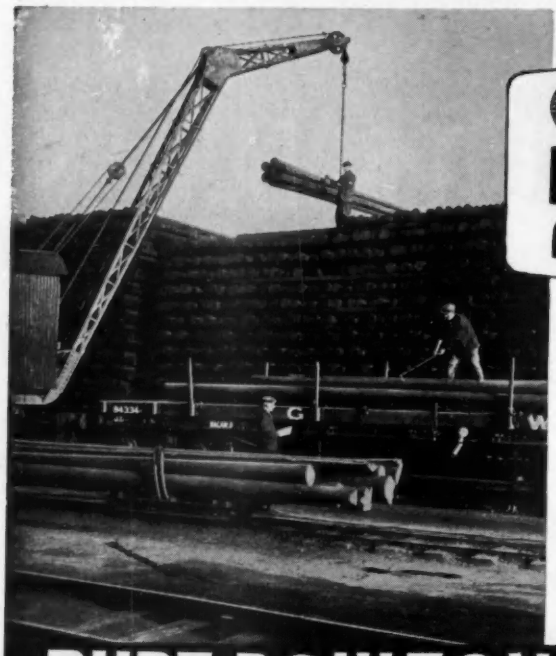

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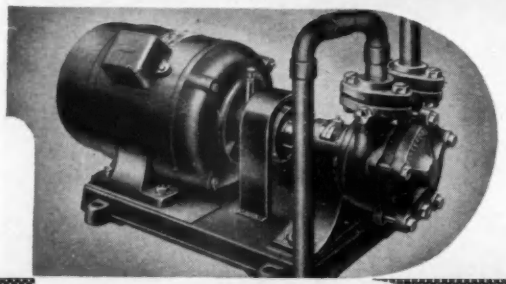

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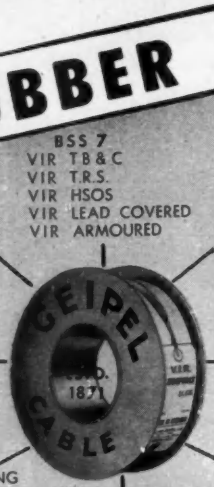

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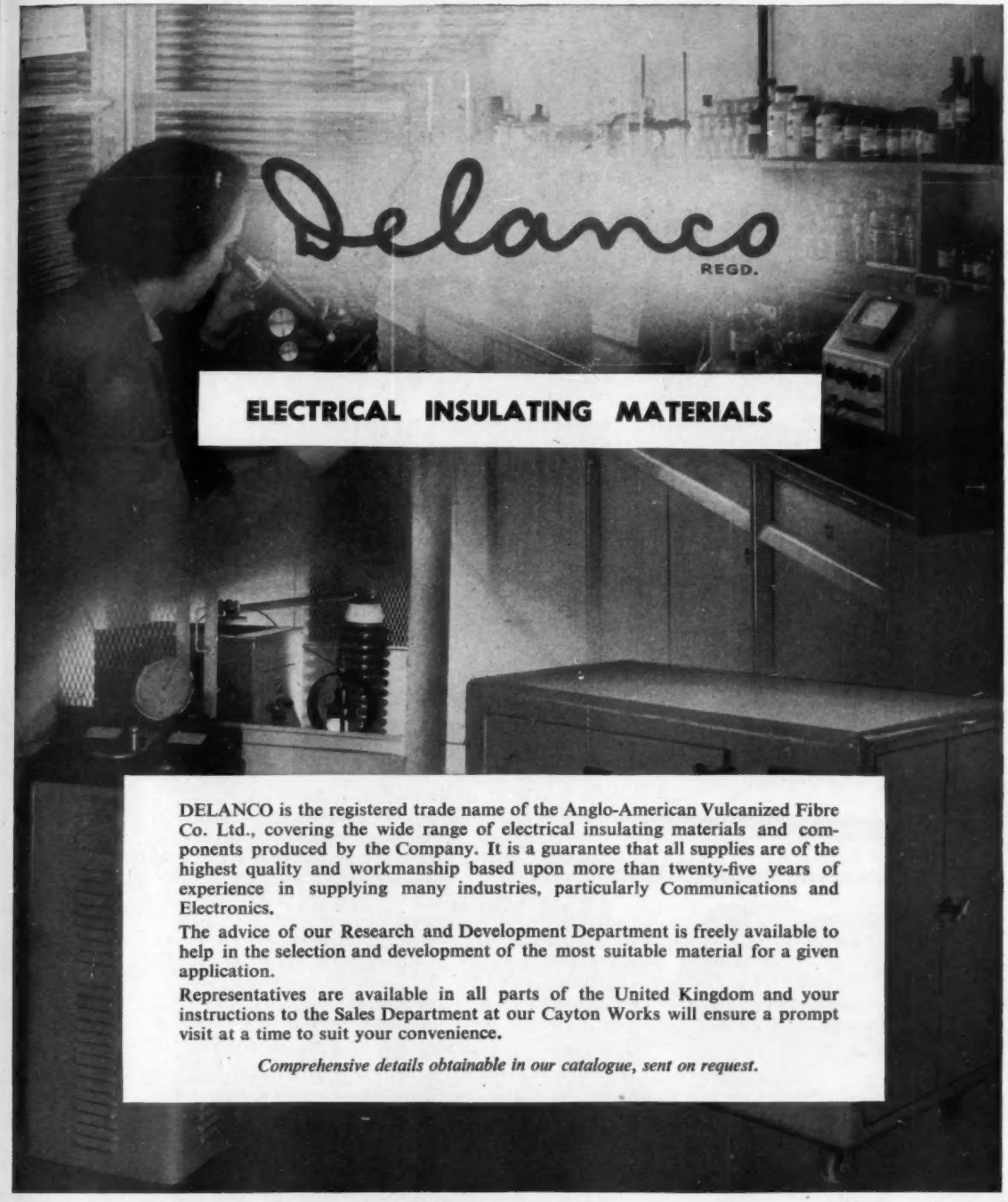

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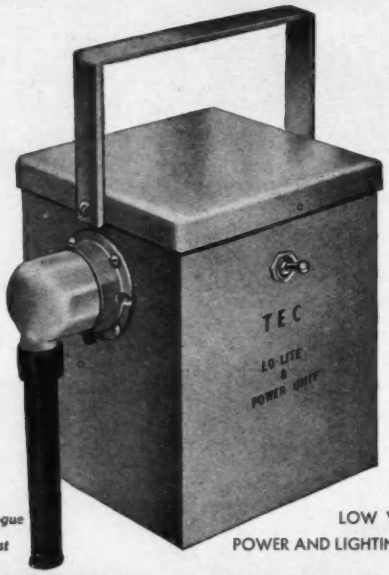

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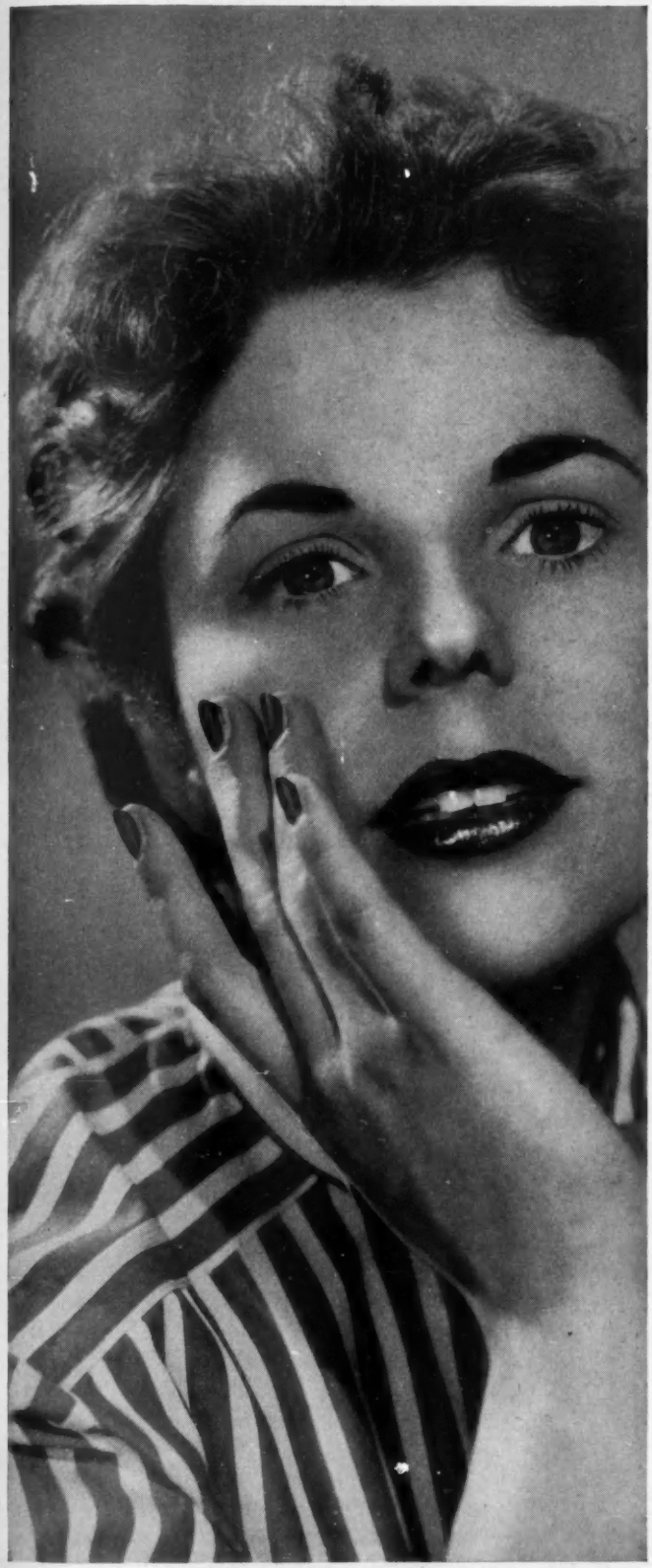

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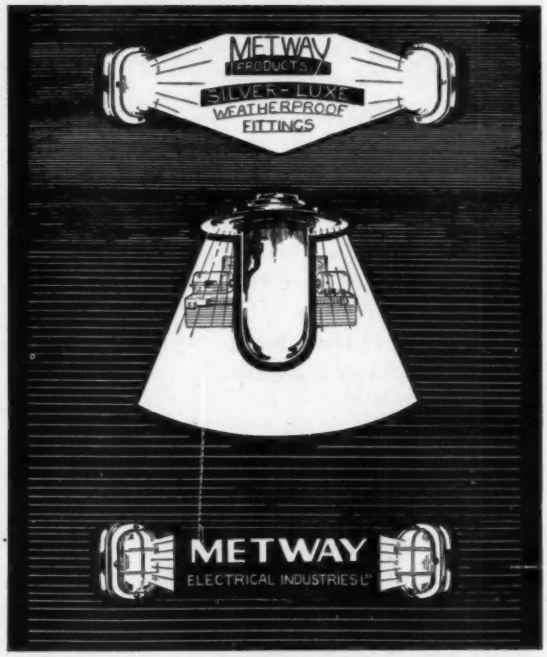

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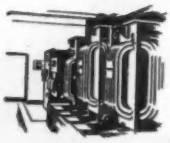

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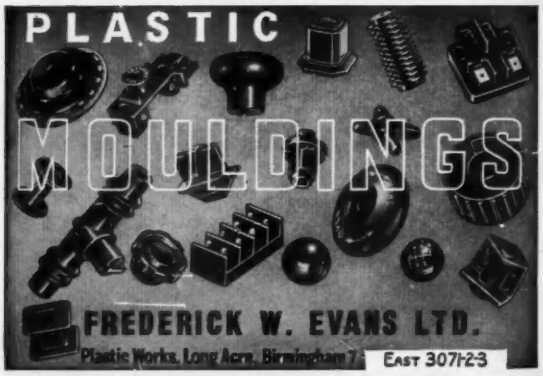

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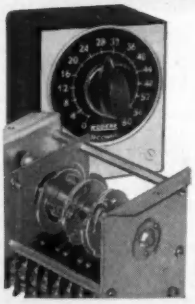

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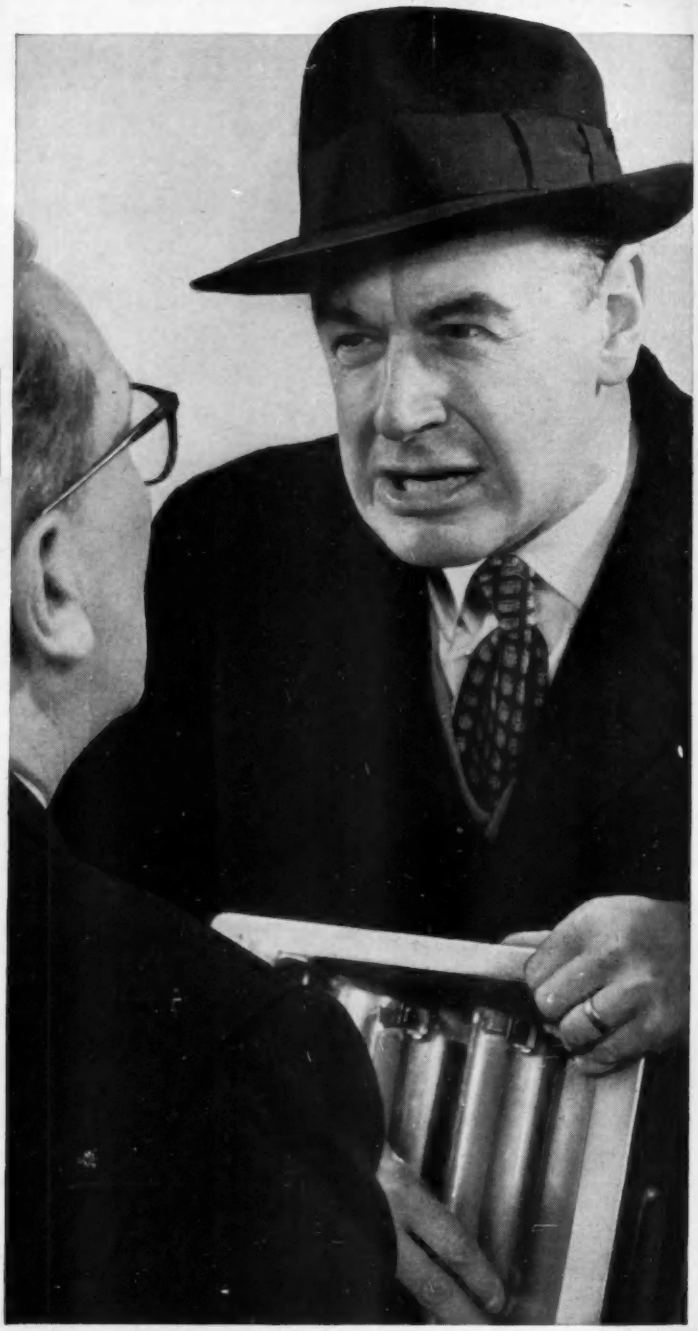

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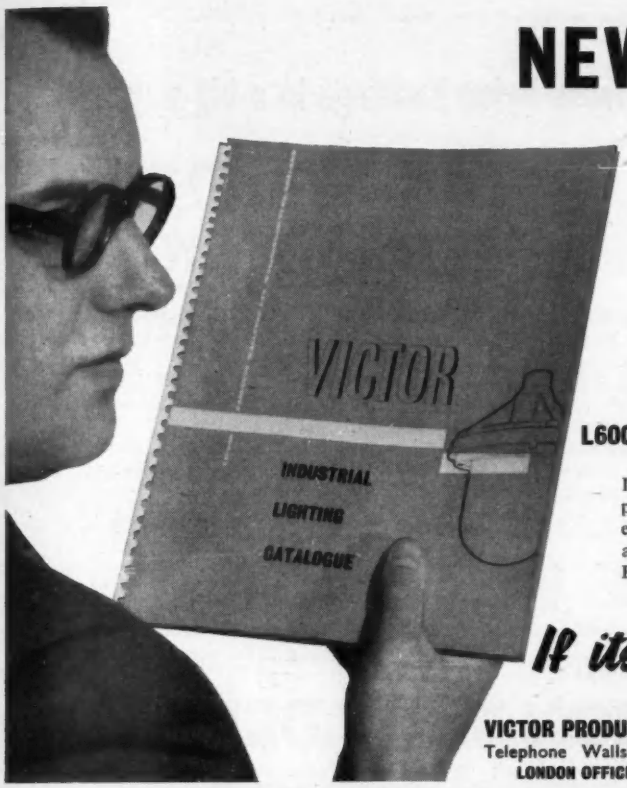

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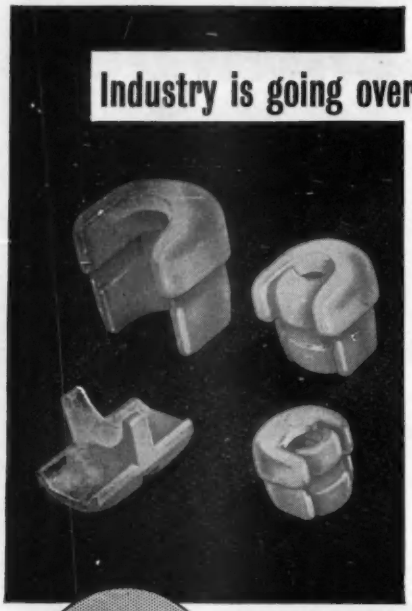

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Since their introduction to this country by us from the U.S.A. I.M. NYLON STRAIN RELIEF BUSHINGS are being used by an ever-increasing variety of trades :— Clocks, Radios, T/V., Fans, Toasters, Mixers, Vacuum Cleaners, Washing Machines, Portable Tools, Air Conditioners, Electric Mowers, Clippers, Drills, Saws, etc. They are rapidly becoming "Standard" where a positive, insulating, non-slip grip is essential. Made from Nylon, they grip tightly without nipping and give a streamlined appearance to the job.

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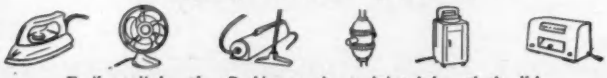

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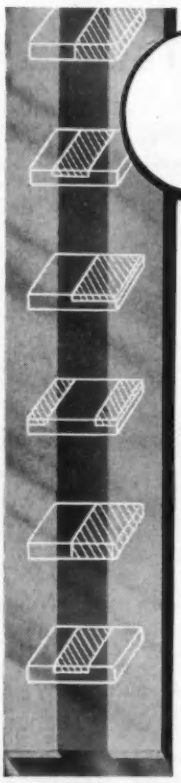

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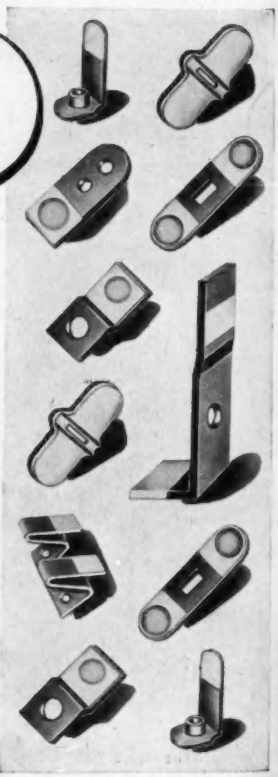

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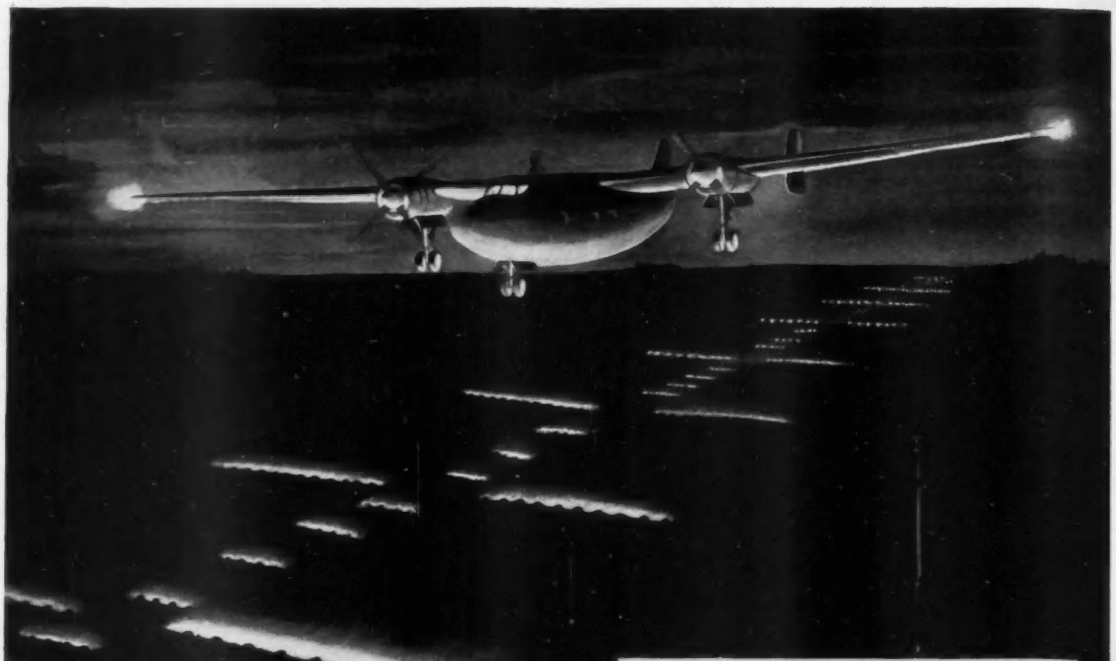

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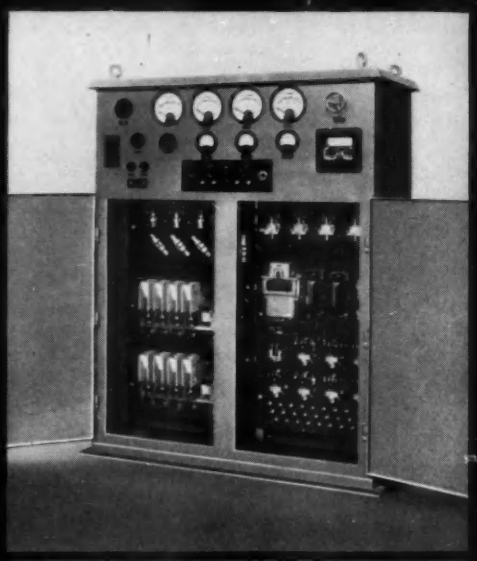

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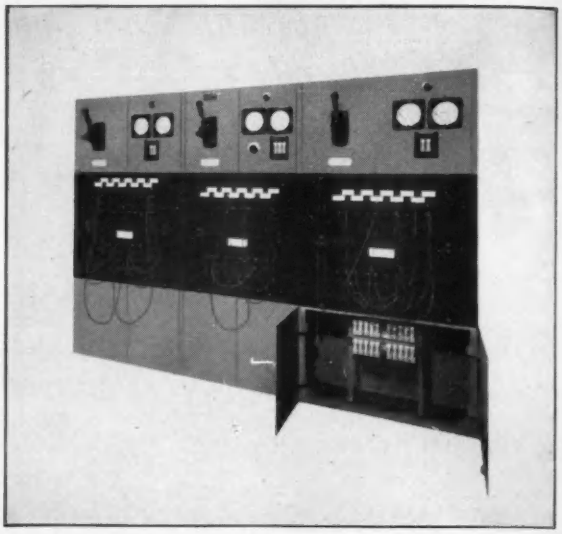

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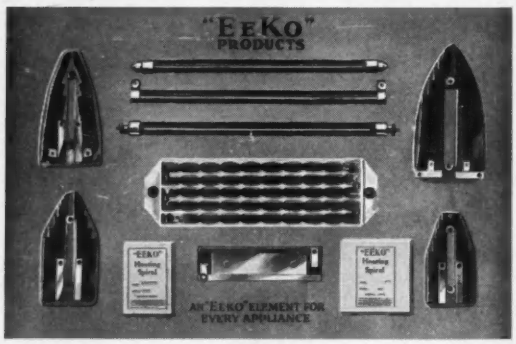

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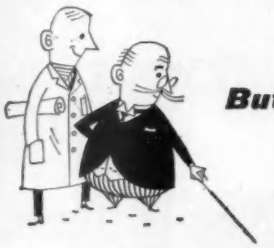

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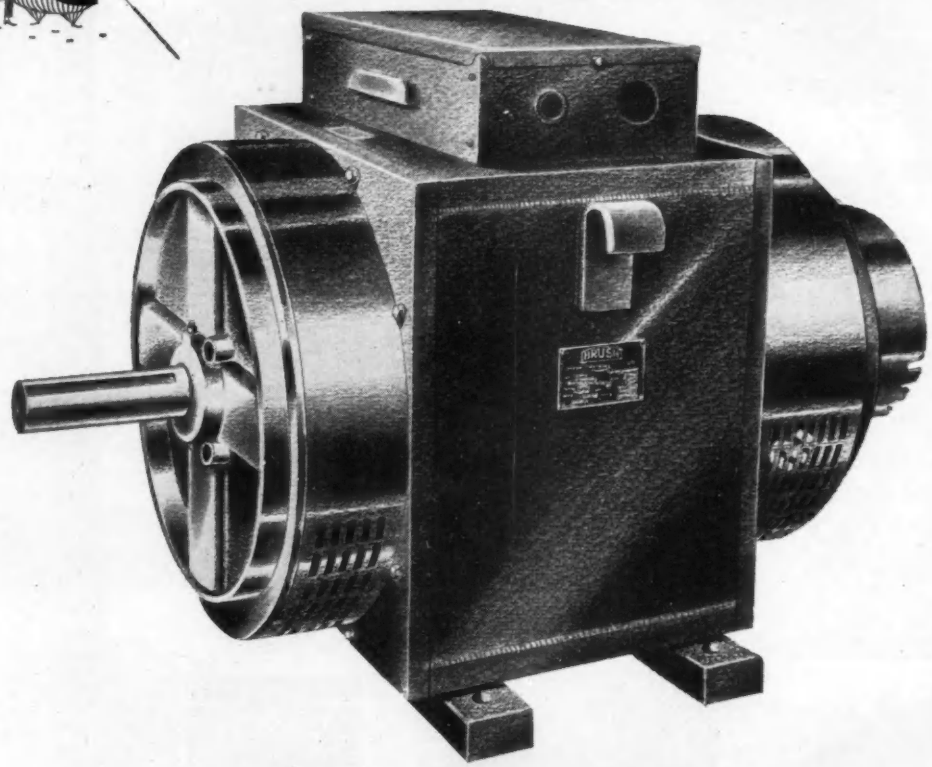

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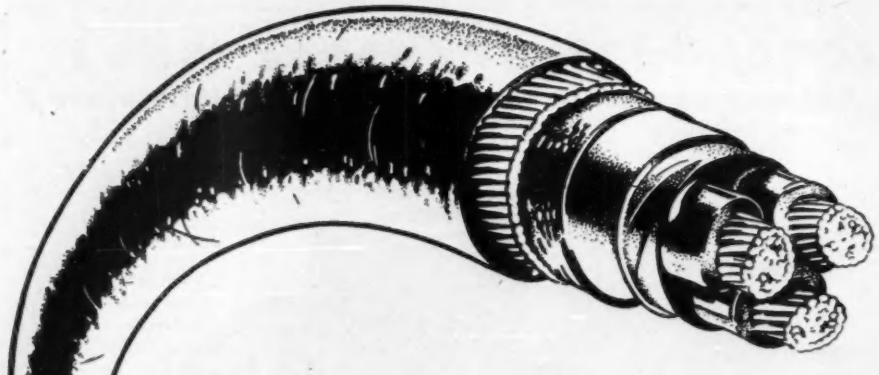

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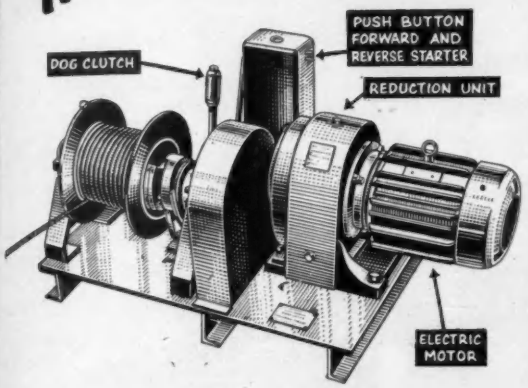

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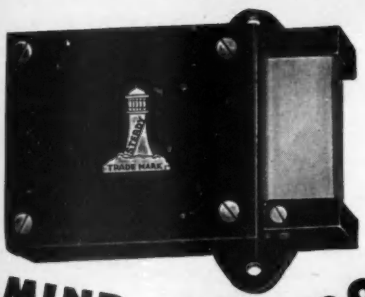

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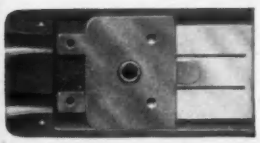
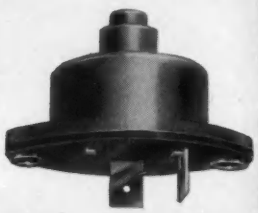


Otter Thermal safety cut-out for Electric Blankets



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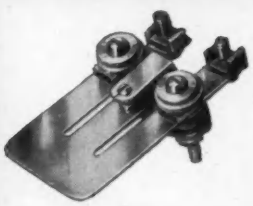

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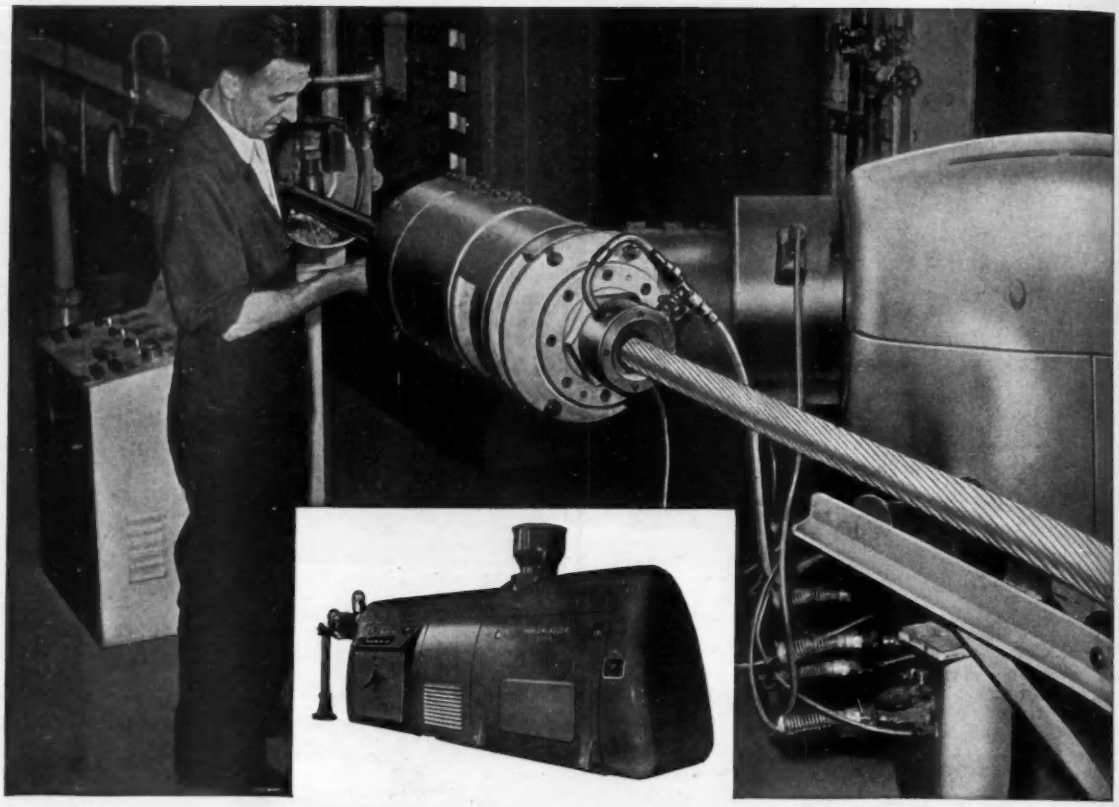

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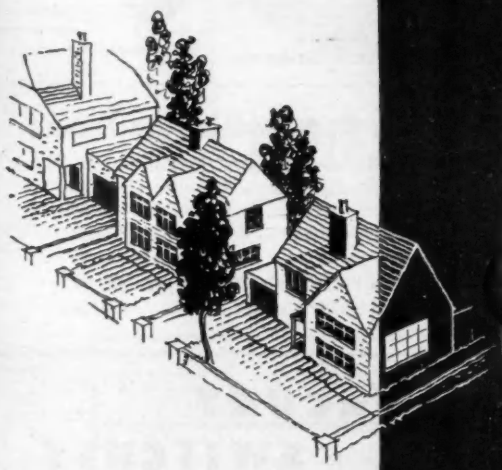

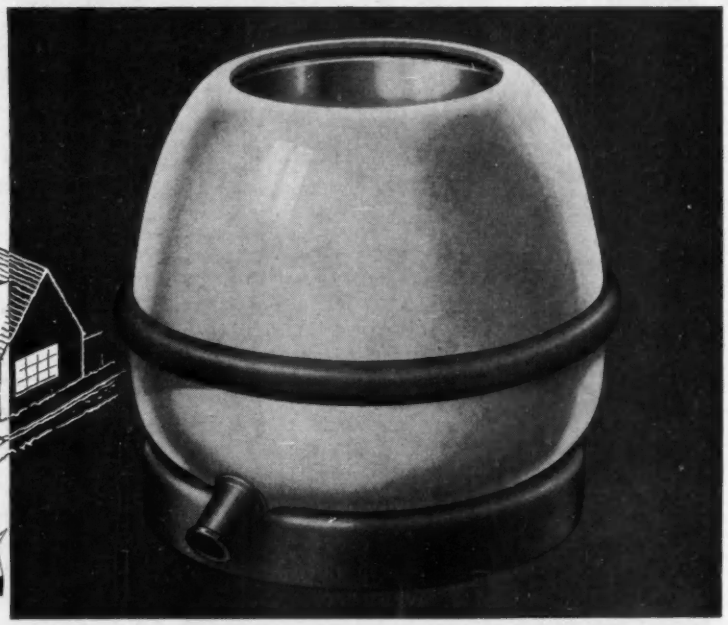

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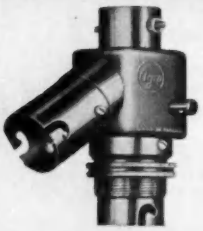

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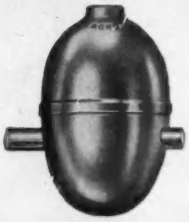

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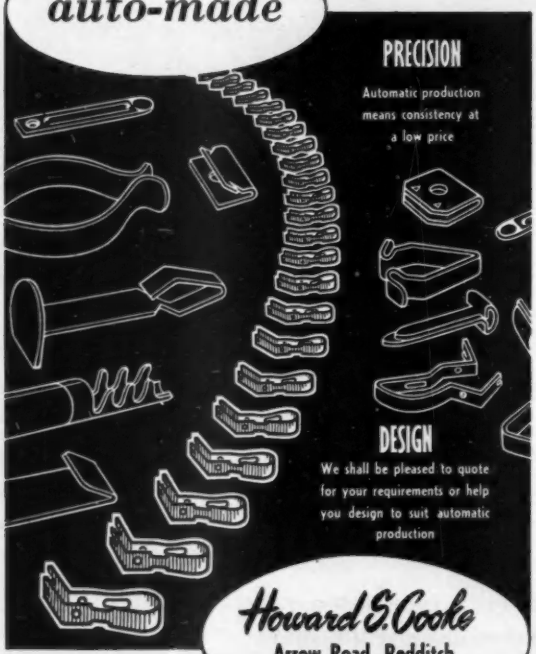

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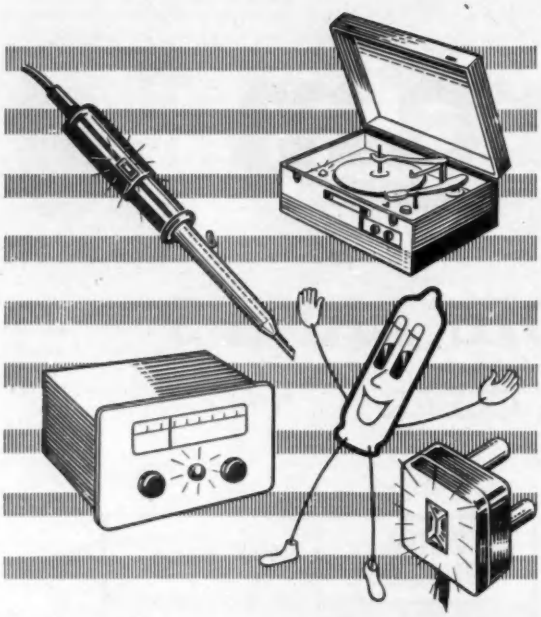

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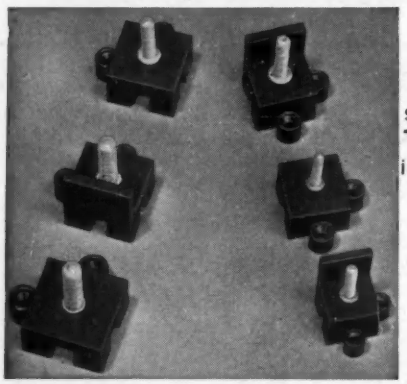

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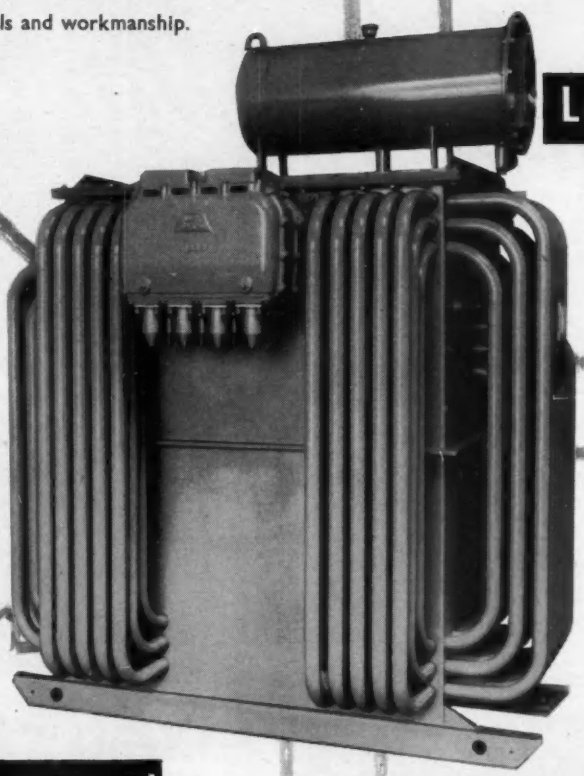

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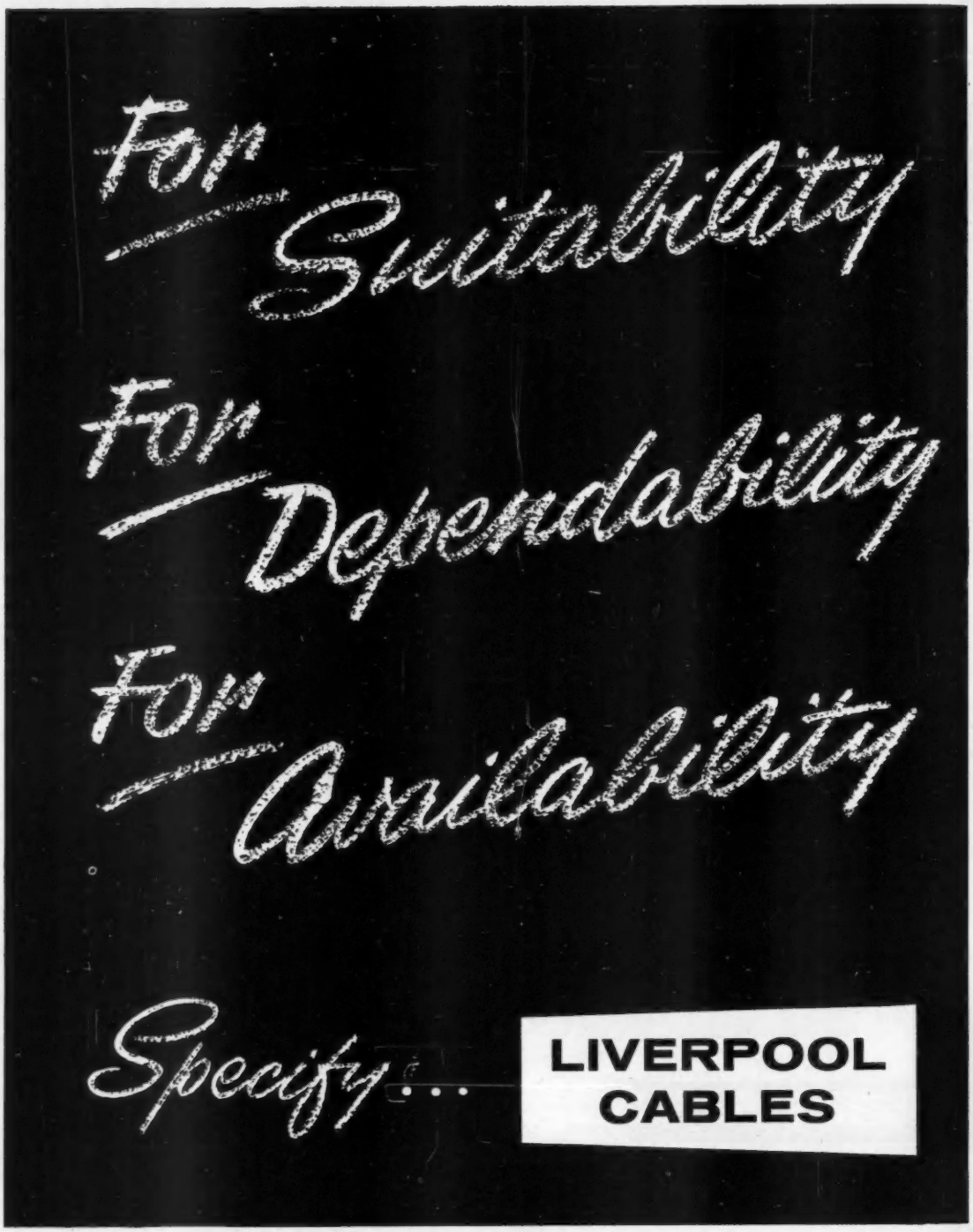

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Electrical Engineers and Contractors

H. J. CASH & CO. LTD.
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Telephone: WHitehall 4774
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EDMUNDSONS CONSTRUCTION CO. LTD.
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F. H. WHEELER & CO. LTD.
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F. H. WHEELER (Southern) LTD.
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Telephone 73867

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Quality House, Temple Row, Birmingham 2
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Electrical Installation Engineers. Industrial Installation Specialists
Established 1895

(Continued on page 114)

(Continued from page 113)

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31 Stafford Street, Birmingham 4
Telephone: Central 7101
For all electrical contracting installations, lighting, heating, power, public address, etc.

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Industrial Electrical Work of All Kinds. Over 40 Years' Experience

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Telephone: Port Talbot 791
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46 Rodney Street, Liverpool 1
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H. J. CASH & CO. LTD.
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Telephone: Central 0452
Electrical Engineers and Contractors

YORKSHIRE

Electrical Engineers and Contractors
SOUTHERN & REDFERN LTD.
Woodhead Road, Bradford 7
Textile Maintenance, Repairs and Rewinds
Telephones: Bradford 23871—Late Phone: Bradford 65837

DALE ELECTRIC (YORKSHIRE) LTD.
Filey, Yorks. Also at Malton and Driffield
Telephone: Filey 2301 (3 lines)
Manufacturers of the DALE diesel and petrol electric generating plants. All types of electrical contracting. Estimates free and without obligation.

EDMUNDSONS CONSTRUCTION CO. LTD.
Electrical Engineers and Contractors
2 Hartley Hill, Leeds 2
Telephone: Leeds 33791

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F. H. WHEELER & CO. LTD.
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Telephone 24015 (3 lines) *Telegrams: "Whelect"*

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F. H. WHEELER & CO. LTD.
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Telephone: York 23172

NORTH WESTERN

STEWART THOMSON & SONS (Liverpool) LTD.
Fort Road, Seaforth, Liverpool 21
Repairs and Rewinds A.C. and D.C. to 3,000 horsepower. Breakdowns, Urgent Repairs, etc. 24-hour service
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W. H. SMITH & CO. ELECTRICAL ENGINEERS LTD.
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Manufacturers of the DALE diesel and petrol electric generating plants. All types of electrical contracting. Estimates free and without obligation.

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52 Elswick Road, Newcastle
Telephone: Newcastle 36271

Applications for particulars of costs and standard style of advertisements in this Regional Guide should be addressed to :

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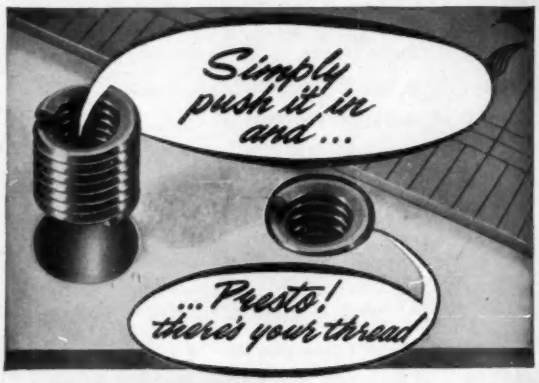
ELECTRICAL REVIEW,
DORSET HOUSE, STAMFORD STREET,
LONDON, S.E.1



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PUSH-TYPE INSERTS
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Eliminate the need for solid bushing and tapping, use a HELI-COIL PUSH-TYPE INSERT the ready-made screw thread for moulded and plastic parts, die cast alloys, powdered metals, all soft light materials and many hard metals. Pushed directly in drilled cast, or moulded, blind or through holes, this is the ideal low-cost, volume production, fastening method. A few shillings in tooling is all you need for up to 1,200 holes and more per hour.

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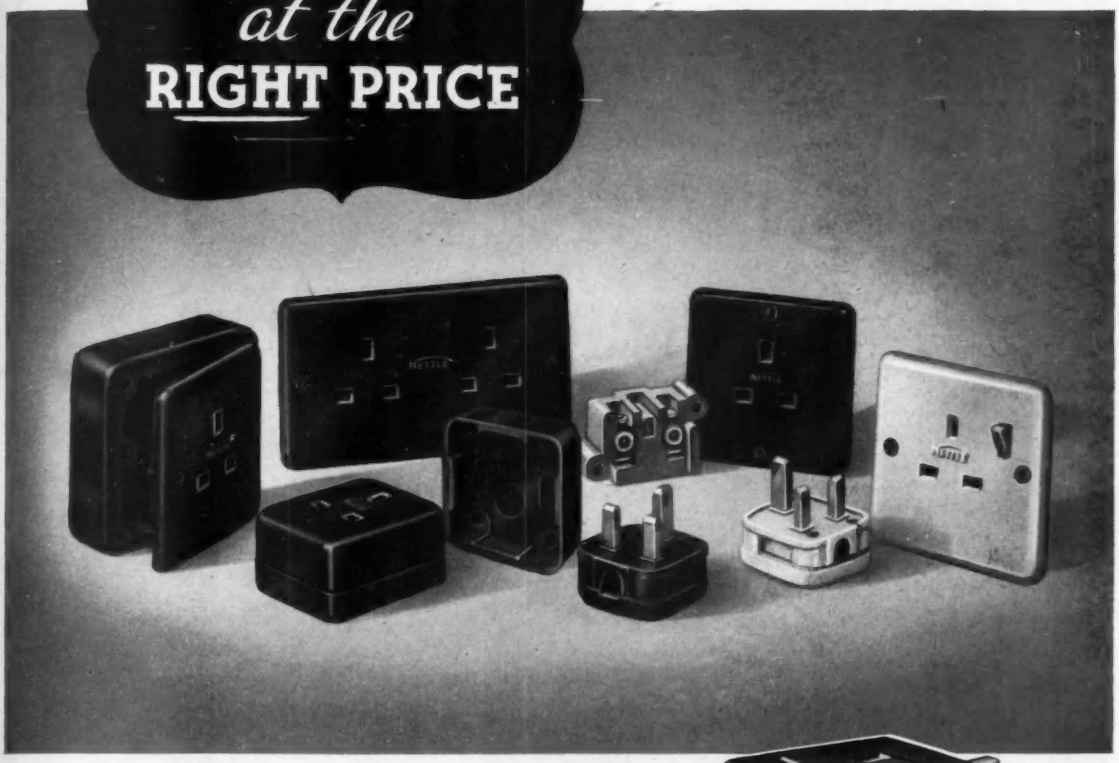

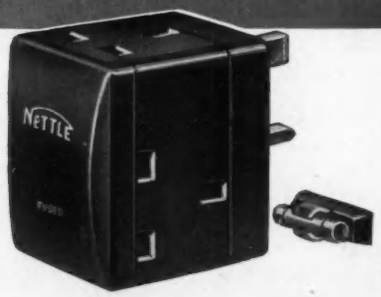

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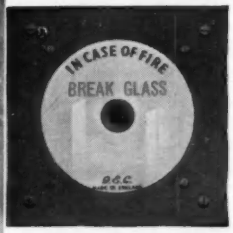
instant warning . . .

Fire caused over 100 million pounds damage to U.K. property in 1955



Don't let *your* premises suffer a similar fate. Instal a G.E.C. fire alarm system.

For details of G.E.C. fire alarm equipment please send for publication L3662.

G.E.C.

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THE GENERAL ELECTRIC CO LTD · MAGNET HOUSE · KINGSWAY · LONDON · W.C.2

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DISPLAYED CLASSIFIED:—48/- per inch. Cheques and Postal Orders should be crossed and made payable to ELECTRICAL REVIEW PUBLICATIONS LTD.

SERIES DISCOUNTS for consecutive insertions:—13, 5%; 26, 10%; 52, 15%.

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REPLIES to Box Numbers should be addressed to the Box Number in the advertisement, c/o ELECTRICAL REVIEW, Dorset House, Stamford Street, London, S.E.1, but if not to be delivered to any particular firm or individual they should be accompanied by instructions to this effect, addressed to the Manager of the ELECTRICAL REVIEW. Replies in such cases cannot be returned. The name of an advertiser using a Box Number will not be disclosed.

ADVERTISEMENTS are accepted up to **First Post on Monday** of the week of issue and should be addressed to ELECTRICAL REVIEW, Classified Advertisement Department, Dorset House, Stamford Street, London, S.E.1

Original testimonials should not be sent with applications for employment

OFFICIAL NOTICES, TENDERS, ETC.

FEDERATION OF RHODESIA AND NYASALAND

Federal Power Board

Kariba Hydro-Electric Scheme

Metering Equipment

THE FEDERAL POWER BOARD will shortly be calling for tenders for the supply, delivery, installation and maintenance of Impulse-actuated Summation Metering and Ancillary Equipment at Kariba Power Station and Kitwe, Norton, Salisbury, Sherwood and Bulawayo Substations.

Contractors who may be interested in tendering for this equipment should submit full details of their qualifications and experience by the 6th March, 1958, after which tender documents and drawings will be issued to those contracting organisations who satisfy the requirements of the Board.

Details, qualifications and experience should be sent in duplicate to the Secretary, Federal Power Board, P.O. Box 630, Salisbury, Southern Rhodesia, with a copy to the Electrical and Mechanical Consulting Engineers, Merz and McLellan, Carliol House, Newcastle upon Tyne, 1, England.

2447

AYR COUNTY COUNCIL

Trunk Road Lighting

THE County Council will shortly issue separate schedules as under in connection with the installation of Lighting on Trunk Road A.78 at Irvine and District.

1. Supply of concrete standards.
2. Supply of electrical equipment.
3. Work of erection.
4. Supply of lanterns for 140-w. SO/H lamps.

Contractors to indicate to County Engineer, County Buildings, Ayr, in which contracts they are interested.

Any attempt to interlink conditionally the schedules will constitute automatic disqualification.

The County Council is not bound to accept the lowest or any offer.

IVIE McCAIG,
County Clerk. 2429

HOLYWELL URBAN DISTRICT COUNCIL

Street Lighting, A.55 Trunk Road

TENDERS are invited for the supply, erection and putting into service of 140-watt Sodium Vapour Units, Group A Lighting. The length of road to be lighted is approximately 3,090 yards.

Plans and conditions of contract may be inspected at the office of the undersigned, from whom specifications, bills of quantities, schedules of outreach and form of tender may be obtained on the payment of a deposit of two guineas, which will be refunded on receipt of a bona fide tender, not subsequently withdrawn.

Sealed tenders, in the envelope provided, must be delivered to the Clerk of the Council not later than 7th March, 1958.

The Council do not bind themselves to accept the lowest or any tender.

F. E. G. GRAY,
Town Hall, Engineer & Surveyor.
Holywell. 2457

FEDERATION OF RHODESIA AND NYASALAND

Federal Power Board

Kariba Hydro-Electric Scheme

Power Station Cabling, 18 and 11 kV and Auxiliary

THE FEDERAL POWER BOARD will shortly be calling for tenders for the supply, delivery, installation and maintenance of 18 and 11 kV and Auxiliary Cables and Accessories for Kariba Power Station, situated on the Zambezi River in the Federation of Rhodesia and Nyasaland.

Contractors who may be interested in tendering for this equipment should submit full details of their qualifications and experience by the 6th March, 1958, after which tender documents and drawings will be issued to those contracting organisations who satisfy the requirements of the Board.

Details, qualifications and experience should be sent in duplicate to the Secretary, Federal Power Board, P.O. Box 630, Salisbury, Southern Rhodesia, with a copy to the Electrical and Mechanical Consulting Engineers, Merz and McLellan, Carliol House, Newcastle upon Tyne, 1, England.

2448

SITUATIONS VACANT

ELECTRICAL DISTRIBUTION CONTROL ENGINEER

THE Operations Branch of the UNITED KINGDOM ATOMIC ENERGY AUTHORITY, Industrial Group, requires a CONTROL ENGINEER at Capenhurst Works, Capenhurst, Chester, to be responsible to the Electrical Engineer (Distribution) for :—

(a) Liaison with C.E.G.B. and works staffs to ensure the safe and efficient operation and control of E.H.V., H.V. and M.V. networks associated with a large and continuously operating chemical engineering works.

(b) Supervision of Shift Control Engineers and their staffs, preparation and issue of all requisite operational instructions, statistics and other relevant data.

(c) Organisation and control, through the Planning Section, of all system protection test work, both on commissioning and subsequent routine maintenance.

A recognised electrical engineering apprenticeship and considerable experience of control and maintenance work associated with extensive power systems are required. Experience in control of labour, preparation of technical reports, control of permit-to-work certificates and planned maintenance schemes as applied to power networks, and detailed knowledge of the Electricity Regulations are essential. Possession of a Higher National Certificate, or an equivalent qualification, in electrical engineering and a C.E.G.B. authorisation, or equivalent, are desirable.

Salary assessed within scale £1,330-£1,575. Contributory pension scheme.

A house or assistance towards legal expenses on house purchase may be available.

Send POSTCARD for application form, quoting reference 2253, to Works Secretary, Capenhurst Works.

Closing date 27th February, 1958. 2462

EASTERN ELECTRICITY BOARD

APPLICATIONS are invited for the following appointments. The successful candidates will be required to contribute to a superannuation scheme and may be required to undergo a medical examination.

Fens Sub-Area, Cambridge

FOURTH ASSISTANT ENGINEER,
Planning and Development,
Sub-Area Headquarters (21/58.R).

The work involves the planning of schemes at L.V. and 11 kV over the whole sub-area and participating in the planning of extensions to the 33 kV system. A good background of technical training in distribution with qualifications of Grad.I.E.E. standard, is desirable. The position offers an excellent opportunity for obtaining experience over a wide field of planning work.

Salary N.J.B. J.13 (£740-£785).

Apply by letter, within 14 days, to the Secretarial Officer, Fens Sub-Area, Eastern Electricity Board, Milton Hall, Milton, Cambridge.

Norfolk Sub-Area

KING'S LYNN & WESTERN DISTRICT
DISTRICT COMMERCIAL ENGINEER
(22/58.R).

Candidates must have experience in the development of electricity supplies both urban and rural, control of service centre and sales staff, installation contracting, administration and operation of hire purchase schemes and general consumer advisory service. Appropriate technical qualifications would be an advantage.

Salary N.J.B. Class F, Grade 4 (£1,065-£1,140).

Apply by letter, within 14 days, to the Manager, King's Lynn and Western District, Eastern Electricity Board, Electric House, Gaywood Bridge, King's Lynn, Norfolk.

NORWICH DISTRICT
FIRST ASSISTANT DISTRICT
COMMERCIAL ENGINEER (23/58.R).

Candidates should have had experience in commercial aspects of industrial and other large power supplies and also experience in negotiations with industrial consumers on power supplies. The successful candidate will be required to deal with tariff negotiations and will be responsible for the administration of a section of the district commercial staff. Experience in control of staff would therefore be an added advantage.

Salary N.J.B. Class G, Grade 6 (£995-£1,055).

Apply by letter, within 14 days, to the Manager, Norwich District, Eastern Electricity Board, 4, Duke Street, Norwich, Norfolk. 2484

COUNTY BOROUGH OF BURTON UPON TRENT EDUCATION COMMITTEE

Technical College

Principal: E. White, M.Sc.(Econ.)

APPLICATIONS are invited for the post of LECTURER in Electrical Engineering vacant as from the 1st May, 1958. Salary will be in accordance with the Burnham Technical Scale.

Forms of application, which may be obtained from the undersigned upon receipt of a stamped addressed foolscap envelope, must be returned as soon as possible.

A. H. BLAKE,
Education Office, Director of Education.
Guild Street,
Burton upon Trent. 2417

Situations Vacant (continued)

YORKSHIRE ELECTRICITY BOARD

No. 4 (Leeds) Sub-Area

SECOND ASSISTANT ENGINEER (Industrial Sales and Development). Applicants should have a general engineering background and be qualified to advise industrial consumers on extending the use of electricity. Practical experience in modern production methods and of heat treatment applications will be an advantage.

Salary N.J.B. Class L, Grade 7, £1,235/£30/£1,325 per annum.

Applications, giving full details of age, qualifications and experience, together with the names of two referees, should be forwarded to the Manager, No. 4 (Leeds) Sub-Area, Yorkshire Electricity Board, Bramhope, Nr. Leeds, not later than 7th March, 1958.

No. 3 (Sheffield) Sub-Area

SHEFFIELD (North) DISTRICT

THIRD ASSISTANT DISTRICT ENGINEER. Applicants should have technical qualifications equivalent to Corporate Membership of the Institution of Electrical Engineers and have had good general experience in distribution work.

Salary N.J.B. Class K, Grade 9, £995/£20/£1,055 per annum.

ROTHERHAM DISTRICT

THIRD ASSISTANT DISTRICT ENGINEER. Applicants should have technical qualifications equivalent to Corporate Membership of the Institution of Electrical Engineers and have had good general experience in distribution work.

Salary N.J.B. Class J, Grade 9, £935/£20/£995 per annum.

Applications, giving full details of age, qualifications and experience, together with the names of two referees, should be forwarded to the Manager, No. 3 (Sheffield) Sub-Area, Yorkshire Electricity Board, Commercial Street, Sheffield, not later than 7th March, 1958.

No. 5 (Wakefield) Sub-Area

BARNSLEY DISTRICT

THIRD ASSISTANT DISTRICT ENGINEERS (2 posts). Applicants should have a sound practical training and experience in the construction, operation and maintenance of H.V. and M.V. overhead and underground distribution networks, substation plant and ancillary equipment.

Candidates should preferably have attained the technical standard of the Higher National Certificate in Electrical Engineering or equivalent qualifications.

Candidates must be prepared to reside in the district and undertake standby duties.

Salary N.J.B. Class G, Grade 9, £835/£15/£880 per annum.

Applications, giving full details of age, qualifications and experience, together with the names of two referees, should be forwarded to the Manager, No. 5 (Wakefield) Sub-Area, Yorkshire Electricity Board, 1a, Denby Dale Road, Wakefield, not later than 7th March, 1958.

No. 6 (Hull) Sub-Area

GOOLE DISTRICT

GENERAL ASSISTANT DISTRICT ENGINEERS (2 posts). Applicants should hold the Higher National Certificate in Electrical Engineering, or equivalent qualifications, and have had training in the construction, operation and maintenance of H.V. and L.V. overhead and underground distribution systems.

Salary N.J.B. Class E, Grade 12, £590/£15/£635 per annum.

Applications, giving full details of age, qualifications and experience, together with the names of two referees, should be forwarded to the Manager, No. 6 (Hull) Sub-Area, Yorkshire Electricity Board, Ferensway, Hull, not later than 7th March, 1958. 2476

ELECTRICAL ENGINEER

A LARGE electrical contracting organisation requires a first-class man with extensive experience of design, estimating and supervision of all types of contracts. Only those who are doing similar work with large contractors need apply. Excellent prospects for the right man, to whom a salary of up to £1,250 p.a. will be offered.

Please write fullest details to—Box 2488.

MIDLANDS ELECTRICITY BOARD

APPLICATIONS are invited for the following posts :—

Central Gloucestershire Sub-Area

THIRD ASSISTANT ENGINEERS (Control) (Five) (Headquarters). The successful applicants will be required to take charge of control operations of 11-kV, 33-kV and 66-kV systems on shift rota. Technical qualifications desirable. Salary £885/£930 per annum (N.J.B. Grade J.10).

Apply by letter within fourteen days stating age, experience and qualifications, present position and salary to Mr. S. Raybould, Sub-Area Manager, Midlands Electricity Board, 126, London Road, Gloucester.

South Staffs. & North Worcs. Sub-Area

GENERAL ASSISTANT ENGINEER (Meter Department) (Headquarters). Duties will include laboratory work, sub-standard instrument calibration, testing of polyphase metering equipment, both in the test room and on consumers' premises, and the carrying out of special tests on other apparatus, including switchgear and relays. Technical qualifications desirable. Salary £590/£635 per annum (N.J.B. Grade L.18).

Apply by letter within fourteen days stating age, education, qualifications, experience, present position and salary to Mr. T. G. Keeler, Sub-Area Manager (Ref. CW), Midlands Electricity Board, P.O. Box No. 9, Toll End Road, Tipton.

A. STEPHENS,
Secretary. 2485

THE EAST AFRICAN POWER & LIGHTING CO. LIMITED

have the following immediate vacancies in

NAIROBI DISTRICT, KENYA COLONY:

SENIOR ENGINEERS
(Distribution Dept.)

Applicants should be between 30 and 38 years of age with practical training and experience in 33 and 11 kV overhead and underground networks, maintenance of H.V. and L.V. systems. Preference given to qualified men A.M.I.E.E. standard, experienced with electricity supply undertaking in both rural and industrial areas.

Commencing salary (including local allowance) £1,200-£1,320 p.a.

ASSISTANT ENGINEERS
(Distribution Dept.)

Applicants should be between 26 and 35 years of age with practical training and experience in operation and maintenance of H.V. and L.V. overhead and underground systems. Preference given to applicants possessing technical qualifications to Grad. M.I.E.E. standard, experienced with electricity supply undertaking in both rural and industrial areas.

Commencing salary (including local allowance) £1,020-£1,200 p.a.

ASSISTANT PROTECTION ENGINEER

Applicant familiar with protection devices associated with generation, transmission and distribution. Must be willing to learn. Preference given to candidate having practical training and qualified to Grad. M.I.E.E. standard.

Commencing salary (including local allowance) £1,020-£1,220 p.a.

In each case exact commencing salary dependent on qualifications and experience. Free married furnished quarters, electricity, family medical benefits and passages. Contributory pension and insurance (with non-contributory dependants' benefit) schemes. Child education allowance. Liberal home leave on full salary.

Write details, age, qualifications and experience :—

The London Secretary
66, Queen Street, London, E.C.4

2467

CLASSIFIED ADVERTISEMENTS ARE PREPAID

SOUTHERN ELECTRICITY BOARD

Engineering Draughtsman

No. 3 (Portsmouth) Sub-Area Office, Substation Section. Salary N.J.B. Grade 4 (£895 × £20 to £995 per annum), dependent upon qualifications and experience. N.J.B. conditions of service.

Applicants should be qualified draughtsmen and the successful applicant will be required to undertake the control of staff and the preparation and final layout of diagrams and drawings relating to substation plant and equipment. Possession of suitable technical qualifications will be an advantage.

Applications on forms obtainable from the Sub-Area Secretary, Lower Drayton Lane, Cosham, Portsmouth, and returned to him in envelopes suitably endorsed not later than 3rd March, 1958.

Assistant Engineer (Local)

Swindon District of No. 2 (Newbury) Sub-Area, located at Cirencester. Salary N.J.B. Grade 11, Class F (£685-£730 per annum). N.J.B. conditions of service.

Applicants should have experience in the design, construction, operation and maintenance of H.V. and L.V. overhead and underground distribution systems, substation plant and distribution equipment, and possess suitable technical qualifications. The appointment will involve standby duties.

Applications on forms obtainable from the Sub-Area Secretary, 7, Oxford Rd., Newbury, and returned to him in envelopes suitably endorsed not later than 3rd March, 1958.

General Assistant Engineer

Aldershot District of No. 3 (Portsmouth) Sub-Area. Salary N.J.B. Class G, Grade 13 (£635 × £15 to £680 per annum). N.J.B. conditions of service.

The duties of the post will be to assist in the preparation of schemes and estimates for extensions and/or reinforcements to overhead and underground H.V. and L.V. networks.

Applications on forms obtainable from the Sub-Area Secretary, Lower Drayton Lane, Cosham, Portsmouth, and returned to him in envelopes suitably endorsed not later than 3rd March, 1958.

General Assistant Engineer

North Sub-Section, Construction Department, Farnborough, No. 3 (Portsmouth) Sub-Area. Salary N.J.B. Class K, Grade 16 (£635 × £15 to £680 per annum). N.J.B. conditions of service.

The duties of the post will be to assist with distribution, including minor construction work and general maintenance of H.V. and L.V. overhead and underground distribution systems, substation plant, etc. This appointment may involve standby duties. Applicants should possess suitable technical qualifications.

Applications on forms obtainable from the Sub-Area Secretary, Lower Drayton Lane, Cosham, Portsmouth, and returned to him in envelopes suitably endorsed not later than 3rd March, 1958.

The successful candidates for the above appointments will be required to contribute to the Electricity Supply (Staff) Superannuation Scheme, if eligible. 2475

INTERNAL SALES ENGINEER

ELECTRICAL ENGINEER required to handle technical correspondence and orders in sales office of well-known instrument company. Knowledge of electrical instruments essential, and applicants must have a good standard of English. Pension scheme.

Please write fully to Personnel Officer, ELLIOTT BROS. (LONDON) LTD., Century Works, Conington Road, Lewisham, London, S.E.13.

2345

SENIOR ELECTRICAL DRAUGHTSMEN

with experience in plant layout.
Pension Fund. Profit Sharing. Canteen.
Apply :
Chief Engineer
A. P. C. M.
Portland House, Tothill Street, London, S.W.1
2433

CENTRAL ELECTRICITY GENERATING BOARD

East Midlands Division

APPLICATIONS are invited for the following appointments in this Division :—

SHIFT CONTROL ENGINEER, NORTH WILFORD POWER STATION (Vacancy No. 24/58/ER).

Applicants should have had a sound training and practical experience in a modern power station. The possession of a Higher National Certificate, or its equivalent, will be an advantage.

Salary will be in accordance with Class K, Grade 10 (£935-£995 per annum) of the National Joint Board Agreement.

Closing date for receipt of applications, 26th February, 1958.

GENERAL ASSISTANT ENGINEER (Chemist), DRAKELOW POWER STATION (Vacancy No. 28/58/ER).

Applicants should have had a sound technical training and some previous laboratory experience and should hold the Ordinary National Certificate in Chemistry.

Salary will be within the range £540-£680 per annum, in accordance with the National Joint Board Agreement.

Closing date for receipt of applications, 26th February, 1958.

SENIOR DRAUGHTSMAN, TRANSMISSION DEPARTMENT, DIVISIONAL HEADQUARTERS (Vacancy No. 29/58/ER).

The work is associated with H.V. electrical substations, etc., and experience on H.V. overhead lines or underground cable systems will be an advantage but is not essential.

Salary will be in accordance with Grade 5 (£760-£860 per annum) of Schedule D of the National Joint Board Agreement.

Closing date for receipt of applications, 5th March, 1958.

These appointments will be pensionable under the terms of the Staff Superannuation Scheme.

Applications should be submitted on the official form AE6/ACT, which may be obtained from the Divisional Establishments Officer, Central Electricity Generating Board, East Midlands Division, P.O. Box 25, Barker Gate, Nottingham, and should be returned to the undersigned by the date stated. PLEASE QUOTE VACANCY NUMBER.

L. F. JEFFREY,
Divisional Controller.

12th February, 1958. 2449

LONDON ELECTRICITY BOARD

Assistant Chief Commercial Engineer (Sales Development and Publicity)

APPLICATIONS are invited for the above appointment at Headquarters, 46, New Broad Street, London, E.C.2.

Candidates should have wide experience in the development of domestic appliance sales, the operation and staffing of service centres, the training of sales staff, window and exhibition displays, advertising and publicity. Corporate Membership of the Institution of Electrical Engineers would be an advantage.

The appointment will be made in Grade 7, Class C of the National Joint Managerial Agreement, the salary being within the range £2,360-£2,560 per annum, inclusive of the London area allowance.

Applications, stating age, qualifications, experience and present position and salary, should be forwarded to the Secretary, London Electricity Board, 46, New Broad St., London, E.C.2, by 7th March, 1958, quoting Vacancy No. V/2438/R.

2489

SOUTH OF SCOTLAND ELECTRICITY BOARD

Stirling Area

SECOND ASSISTANT ENGINEER required for Construction Department at the undernoted address.

The successful applicant will be expected to possess at least a Higher National Certificate in Electrical Engineering, or equivalent qualification.

The duties which will be prescribed by the area engineer, will generally consist of supervising the construction of indoor and outdoor substations, the erection of overhead lines and the laying of underground cables up to and including 33 kV. This will involve the preparation of relative contracts and supervision of contractors and direct labour.

Conditions of service will be in accordance with the National Joint Board Agreement for the Electricity Supply Industry. The post is superannuable.

The salary will be in accordance with said agreement, the present grading being Class J, Grade 7, £1,065/£1,140, with placing according to age and experience.

Application forms may be obtained from, and should be returned to the undersigned not later than 11th March, 1958.

JAMES G. CURTIS,
Area Manager.

"Woodlands,"
St. Ninians Road,
Stirling.

13th February, 1958. 2482

THE NUCLEAR POWER PLANT COMPANY LIMITED

DESIGN ENGINEER

required.

THIS is a senior appointment calling for a man with experience in plant cost and steam cycle optimisation.

Candidates must have a sound knowledge of the fundamentals of power station control and of design of turbo generating plant and conventional power station auxiliaries.

The appointment will be held at Knutsford, and assistance with housing is offered to married men. The company operates a contributory pension scheme.

Written application giving full details of age, education, qualifications and career to date should be sent to—

The Secretary,
The Nuclear Power Plant Co. Ltd.,
Booths Hall,
Knutsford, Cheshire,

quoting reference ER/TECH/34.

2465

SOUTH WALES ELECTRICITY BOARD

APPLICATIONS are invited for the position of COMMERCIAL ASSISTANT in District 347 (Cardiff East) in the Central Sub-Area of the Board.

Salary Class G, Grade 12 (£685/£730) of the N.J.B. Agreement.

Applications stating age, present position and salary, qualifications, experience, and three referees, should be addressed to the Secretary (Establishments Section), St. Mellons, Cardiff, so as to reach him not later than Friday, 28th February, 1958. 2431

CENTRAL ELECTRICITY GENERATING BOARD

London Division

APPLICATIONS invited for the following superannuable posts. Conditions of service in accordance with N.J.B. Agreement, Schedule A or B. Salary includes London allowance. Qualifications entitling to Graduate Membership of the I.E.E. or I.Mech.E. an advantage.

ASSISTANT BOILER HOUSE SHIFT CHARGE ENGINEER, BARKING A/B POWER STATION (Vacancy No. 58/107).

Experience with modern boiler operation, including pulverised fuel plant. Salary Class L, Grade 11 = £985 plus £93 10s. shift p.a.

ASSISTANT ENGINEER (Instruments), BRUNSWICK WHARF POWER STATION (Vacancy No. 58/108).

Maintenance of steam and water instruments and boiler control. Salary Class K, Grade 12 = £885 p.a.

ASSISTANT CHEMIST, DIVISIONAL CHEMISTRY LABORATORY, BATTERSEA POWER STATION (Vacancy No. 58/109).

Duties include investigation into chemical aspects of power station operation, including corrosion, air and river pollution studies and provision of analytical services. A degree, A.R.I.C. or equivalent is required, but knowledge of electricity generating industry not essential. Salary Class AX/EX, Grade 7 or 8 = £750 to £1,085 p.a.

FOURTH ASSISTANT ENGINEER (Meter Section), TECHNICAL DEPARTMENT, DIVISIONAL HEADQUARTERS (Vacancy No. 58/110).

Candidates should be experienced in calibration and maintenance of polyphase meters, relays, instruments and the testing of instrument transformers. Knowledge of electronic equipment of all types will be an advantage. Salary Class AX/EX, Grade 8 = £750 to £985 p.a.

(Applicants for Vacancy 58/42 will be considered and need not re-apply.)

Applications, quoting vacancy number, to (or on form from) Central Electricity Generating Board, London Division, P.O. Box 136, London, W.1, by 3rd March, 1958. 2450

SOUTH OF SCOTLAND ELECTRICITY BOARD

Kincardine Generating Station

APPLICATIONS are invited for the following superannuable appointments :—

(1) STATION SUPERINTENDENT (Ref. No. E1/58).

(2) DEPUTY STATION SUPERINTENDENT (Ref. No. E2/58).

The station, at present under construction, is situated on the Firth of Forth in Central Scotland, and will consist of 3 120-MW units followed by 2 200-MW units, giving an ultimate capacity of 760 MW. The units will be coal fired with reheat, having steam conditions of 1,500 p.s.i., 1,000° F for the 120-MW units and 2,350 p.s.i., 1,050° F for the 200-MW units.

Candidates should possess qualifications admitting to Corporate Membership of the Institution of Electrical Engineers and/or Institution of Mechanical Engineers.

Arrangements are being made to provide housing accommodation for the successful candidates.

The appointment of Station Superintendent will be in accordance with the National Joint Managerial and Higher Executive Salary Scale, commencing on Class C, Grade 5, £1,900/£2,100 per annum and ultimately rising to Class E, Grade 5, £2,300/£2,500 per annum.

The appointment of Deputy Station Superintendent will be in accordance with the National Joint Board Salary Scale, commencing on Class K, Grade 3, £1,560/£1,665 per annum and ultimately rising to Class M, Grade 3, £1,825/£1,945 per annum.

Apply, quoting appropriate reference number, on standard form AE6, available from the Secretary, P.O. Box 173, 351, Sauchiehall St., Glasgow, C.2, not later than Friday, 28th February, 1958. 2392

Situations Vacant (continued)

SOUTH OF SCOTLAND ELECTRICITY BOARD

Lanarkshire Area

Second Assistant District Engineer Uddingston District

APPLICATIONS are invited for the above appointment. Applicants should possess the necessary technical qualifications and should have had a sound engineering training with subsequent experience in the operation and maintenance of H.V. and L.V. underground and overhead distribution systems and with H.V. fault location. They should also be conversant with load flow diagrams and voltage drop calculations.

The salary and conditions of service will be in accordance with the National Joint Board Agreement, Schedule A. The present classification and grading is F.7. Salary £885/£930 per annum. This post is superannuable, subject to satisfactory evidence of health. The successful candidate will require to reside within a reasonable distance of the district offices at Uddingston, and to take part in standby duty in accordance with the above agreement.

Application forms, which may be obtained from the undersigned, should be forwarded to this office within 14 days of the date of this advertisement.

DUGALD SMITH,
Manager.
137, Almada Street,
Hamilton. 2480

METER AND RELAY CONTRACTS ENGINEERS

'ENGLISH ELECTRIC'
STAFFORD

OPENINGS exist in the expanding Meter and Relay Department here, for Engineers to handle Power Systems Relay and Meter Contracts. Applicants should preferably have had experience in the light electrical manufacturing industry and be technically qualified to the Ordinary National Certificate or equivalent standard. These appointments are permanent, progressive and will rank for normal admission after the usual probationary period into the company's staff pension scheme.

The work involves the translation of customers' specifications into manufacturing instructions and both engineering and commercial supervision of contracts through all stages of their execution.

As well as providing an opening into an interesting and promising career we should mention that this work is carried on in a large new office building under pleasant and congenial surroundings.

Suitable applicants will be invited to Stafford at our expense when they will be able to gain an impression of the locality as well as the work they will undertake.

Applications giving full details of experience and qualifications should be addressed to Dept. C.P.S., 336/7, Strand, London, W.C.2, quoting Ref. ER1297K.

359

MAKE YOUR CAREER WITH STEWARTS AND LLOYDS LIMITED

who are extending their Manipulated Pipework Department and require

SENIOR MECHANICAL ENGINEERING DRAUGHTSMEN

for pipework systems for:
Nuclear and Super-pressure Power Stations,
Conventional Steam Raising Plants,
all types of industry.

Duties include visits to site and discussions with customers. Training will be given where necessary.

Holiday arrangements honoured. Good salaries, 5-day week, pension fund and canteen.

Apply Secretary, Stewarts and Lloyds Ltd., Broad Street Chambers, Birmingham, stating age, experience, etc. 118

CENTRAL ELECTRICITY GENERATING BOARD

North Eastern Division

APPLICATIONS are invited for the position of FOURTH ASSISTANT ENGINEER (Section) in the Norton Section of the Transmission Department with headquarters at Letch Lane, Carlton, near Stockton on Tees.

The successful applicant will be required to assist in the operation and maintenance of 275-kV, 132-kV and 66-kV overhead lines and substations. Previous training with a large manufacturer of E.H.T. switchgear and transformers is desirable, and experience on maintenance of overhead lines would be an advantage.

Applicants should have had a good general education and possess a Higher National Certificate in Electrical Engineering or equivalent qualifications.

The salary for the appointment (which is superannuable) will be in accordance with the National Joint Board Agreement, Schedule B, Grade 7 (£810-£1,010) per annum and will commence at a point commensurate with qualifications and experience.

Forms of application may be obtained from the Divisional Establishments Officer, Central Electricity Generating Board, North Eastern Division, Carliol House, Newcastle upon Tyne 1, to arrive not later than 7th March, 1958. 2430

INSTRUCTION BOOK WRITER

ENGLISH ELECTRIC
STAFFORD

THE company wishes to appoint a Technical Writer interested in the compilation of operating procedures and installation and maintenance instructions associated with POWER SYSTEM METERING AND RELAY EQUIPMENT.

Applicants should have a sound technical background, preferably in the light current manufacturing or operating fields. They should also have a flair for written expression.

Applications, which will be treated confidentially, should contain details of age, qualifications, experience, present position and status.

Please write to the Central Personnel Services, 336/7, Strand, London, W.C.2, quoting Reference ER.1292C.

2325

JOSEPH LUCAS (ELECTRICAL) LIMITED

Great King Street, Birmingham, 19

ENGINEER

EXPANSION of development of ignition equipment for gas turbines and allied projects creates a vacancy for a practical engineer with experience of design for economic production of electrical apparatus. The work is of a high technical standard and applicants should preferably possess an honours degree.

The post is permanent and pensionable and offers considerable scope for advancement to a progressive engineer.

Apply in writing stating age, qualifications and experience to the Personnel Manager, Joseph Lucas (Electrical) Ltd., Great King Street, Birmingham, 19, quoting reference PM/D/190.

128

CENTRAL ELECTRICITY GENERATING BOARD

North Eastern Division

Assistant Engineer (Instruments), Blyth "A" and "B" Power Stations

APPLICATIONS are invited for the post of ASSISTANT ENGINEER (Instruments) in the Steam Testing Department at Blyth "A" and "B" Power Stations, Northumberland.

Applicants must have had wide experience of power plant instrument maintenance, should have served a recognised apprenticeship, and have a technical education to at least Higher National Certificate standard. A qualification, or experience, in electronics will be considered an advantage.

The successful applicant's duties will include the control of a staff of instrument technicians and mechanics carrying out routine preventive maintenance, fault location and adjustments on the steam plant instruments and associated automatic control equipment.

The commencing salary for the appointment will be in accordance with the National Joint Board Agreement, Schedule A, Grade 8, Class L (£1,160-£1,235) rising to Class M (£1,235-£1,325) when Blyth "B" is commissioned.

Forms of application may be obtained from Divisional Establishments Officer, Central Electricity Generating Board, North Eastern Division, Carliol House, Newcastle upon Tyne 1, to whom they should be returned to arrive not later than 8th April, 1958. 2460

AIR MINISTRY

STATION ENGINEERS (G.D.) and STATION ENGINEERS (Mech.) required at R.A.F. and M.T.C.A. Stations. Qualifications required: (a) O.N.C. Electrical or Mechanical, or show that equivalent standard of technical education attained; (b) recognised apprenticeship in electrical or mechanical engineering with firm or establishment of good repute; (c) 3 years' employment in electrical and mechanical engineering, preferably on operation and maintenance of mine, factory or workshops plant and services. Preference given to candidates with supervisory experience subsequent to (b) and (c).

Work consists of installation, operation and maintenance and high-medium-voltage electrical distribution system electrical installation, generating plant, steam and hot water heating systems and miscellaneous works plants, tools and equipment.

Commencing salary according to age, qualifications and experience on range £655-£820. Appointments non-pensionable. Liability for tours of duty overseas for which special allowance payable in addition to higher salary.

Applications from natural-born British subjects only, up to age 45 years.

Write giving age, full details of qualifications and experience (quoting PE.3140 and PE.3141) to Manager, Ministry of Labour and National Service, 1-6, Tavistock Square, London, W.C.1. Only candidates selected for interview will be advised. 261

ENGINEERS

ADVANCE WITH THIS ELECTRONIC AGE

TO augment an ENGINEERING DESIGN TEAM at present being formed in the field of OFFICE EQUIPMENT, an opportunity occurs for a young Engineer with experience in ELECTRIC AND ELECTROMAGNETIC SWITCHING ASSEMBLIES and components.

Preference will be given to one having experience in the DESIGN and MANUFACTURE of such equipment. The applicant should be prepared to work in Dundee, Scotland, and must provide evidence of adequate technical qualifications.

THE OPPORTUNITIES FOR ADVANCEMENT ARE MOST FAVOURABLE AND AN ATTRACTIVE SALARY IS OFFERED FOR THE SUCCESSFUL APPLICANT.

Apply to:

Industrial Relations Officer
THE NATIONAL CASH REGISTER COMPANY (MANUFACTURING) LTD.
Kingsway West, Dundee

327

CENTRAL ELECTRICITY GENERATING BOARD

North Eastern Division

Fourth Assistant Engineer, Technical Dept.

APPLICATIONS are invited for the above appointment in the Protective Gear and Electrical Plant Testing Section of the Technical Department with headquarters at Newcastle upon Tyne.

The duties consist of the testing, commissioning and maintenance of electrical protective gear and the testing and commissioning of alternators, transformers, switchgear, lines, etc., designed for working at voltages up to 275 kV and their ancillaries.

Applicants should possess qualifications approaching Grad. I.E.E. standard and have experience with protective gear.

The salary for this appointment (which is superannuable) will be in accordance with the National Joint Board Agreement, Schedule B, Grade 7 (£810-£1,010 per annum) and will commence at a point commensurate with qualifications and experience.

Forms of application may be obtained from Divisional Establishments Officer, Central Electricity Generating Board, North Eastern Division, Carliol House, Newcastle upon Tyne 1, to arrive not later than 7th March, 1958.

2461

RESIDENT ENGINEER

DURGAPUR STEELWORKS, INDIA

THE ENGLISH ELECTRIC COMPANY LIMITED wish to appoint a RESIDENT ELECTRICAL ENGINEER who will be responsible for general administration of the contract and supervision of site staff for erection of the company's equipment in the new British Steelworks now under construction at Durgapur.

This will be a permanent appointment on the staff of The English Electric Company with an initial tour of 2 to 3 years in India.

Candidates with extensive experience in the electrical engineering industry are invited to write with full details to—

Dept. C.P.S.
336/7, Strand, London, W.C.2

quoting
Reference ER1290A.

2451

EAST MIDLANDS ELECTRICITY BOARD

Senior Draughtsman: Derbyshire and Nottinghamshire Group (Planning and Construction)

APPLICATIONS are invited for the position of SENIOR DRAUGHTSMAN in the Derbyshire and Nottinghamshire Group of the East Midlands Electricity Board.

Applicants should be capable of undertaking the preparation and final layout of the drawings and diagrams relating to substation plant and equipment, including the design of control buildings, concrete structures and foundations, and all civil works associated with modern practice in outdoor step-down substations.

The possession of a Higher National Certificate or similar qualification in Electrical Engineering would be an advantage.

The salary will be in accordance with the National Joint Board Agreement, Schedule D, Grade 4 (£895 × £20 to £995 per annum).

Applications stating age, experience, qualifications, previous and present appointment should be forwarded to the Chief Engineer, East Midlands Electricity Board, Mapperley Hall, Nottingham, so as to reach him within fourteen days of the issue of this advertisement.

2432

SOUTH EASTERN ELECTRICITY BOARD

ASSISTANT DISTRICT ENGINEER, Medway District.

Salary £790-£835 under N.J.B. Class F, Grade 9. Superannuable. Applicants should have had a good general education and be technically trained up to Higher National Certificate standard and must have had practical training and experience in general distribution work for systems up to 11 kV.

Applications, naming two referees, to Ramsden Mellor, Esq., M.I.E.E., Medway District Manager, SEEBOARD, Gardiner Street, Gillingham, Kent, by 5th March, 1958.

DISTRICT COMMERCIAL ASSISTANT, Crawley and Horsham District.

Salary £500 × £20 to £600 p.a. under N.J.C. Grade 1. Superannuable. Applicants should have experience in contracting, dealing with consumers' enquiries, supply matters, tariffs, a sound general knowledge of domestic electrical appliances, agricultural and commercial supplies.

Applications, naming two referees, to L. J. Simmons, M.I.E.E., M.B.I.M., District Manager, SEEBOARD, 32/40, North Street, Horsham, by 5th March, 1958.

A. L. BURNELL,
Secretary.

2478

HIGH-VOLTAGE RESEARCH

SEVERAL GRADUATES IN ELECTRICAL ENGINEERING or PHYSICS, or holders of the H.N.C. in Electrical Engineering, are required in a HIGH-VOLTAGE RESEARCH LABORATORY for experimental research on HIGH-VOLTAGE PROBLEMS associated with surge diverters and other products of the company. The work covers a wide range and includes the construction and use of impulse voltage and impulse current generators, high direct voltage generators and electronic equipment.

Candidates should be able to carry out investigations without close supervision.

Previous works training and laboratory experience are desirable.

The appointments are permanent and pensionable; and starting salary will be in accordance with qualifications.

Applications, quoting reference Q.10, giving details of age, qualifications and experience, should be made to :—

Personnel Manager
METROPOLITAN-VICKERS ELECTRICAL CO. LTD.
Trafford Park, Manchester, 17

2324

BRUSH ELECTRICAL ENGINEERING CO. LTD.

has a vacancy for

SENIOR CONTRACTS ENGINEER

APPLICANTS should preferably possess a university degree or equivalent, and have had experience in a switchgear manufacturing company.

The applicant will be required to co-ordinate the engineering and drawing office sides of large contracts and should preferably have some experience of associated commercial aspects.

Applications should give particulars of past experience, qualifications, etc., and should be addressed to the :—

Chief Personnel Officer,
Brush Electrical Engineering Co. Ltd.,
Loughborough, Leics.,

and should quote reference SD.7346.

2452

SOUTH OF SCOTLAND ELECTRICITY BOARD

Edinburgh and Borders Area

APPLICATIONS are invited for the undernoted vacancy in Edinburgh:—

THIRD ASSISTANT DISTRICT ENGINEER (Edinburgh East District).

Salary N.J.B. Schedule A, Class F, Grade 9 (£790/£835).

Conditions of service will be in accordance with the National Joint Board Agreement for the Electricity Supply Industry and the successful candidate will, subject to satisfactory evidence of health, require to become a contributor to the Board's superannuation scheme.

Applicants should have a sound training and subsequent experience with H.V. and L.V. underground distribution systems, including the operation and maintenance of H.V. and L.V. switchgear and cables and a knowledge of protective gear and fault location. The possession of a National Certificate in Electrical Engineering is desirable.

The successful candidate will require to reside within a reasonable distance of district headquarters.

Applications on the standard form, obtainable from the undersigned or any other Area Manager, should be submitted not later than 10th March, 1958.

C. H. A. COLLYNS,
52, Melville Street, Manager.
Edinburgh, 3.
14th February, 1958. 2479

NORTH EASTERN ELECTRICITY BOARD

APPLICATIONS are invited for the following appointments, all subject to N.J.B. Agreement for Electricity Supply Industry.

Area Board Headquarters

THIRD ASSISTANT ENGINEER, Chief Commercial Officer's Department, Carliol House, Newcastle upon Tyne. Applicants should have experience in commercial development activities (preferably including experience at district level) covering sales, hire purchase schemes, the negotiations of new supplies for housing estates, etc., and for commercial supplies involving substations.

Salary Schedule B, Grade 6, £895/£1,110.

Tees Sub-Area

FIRST ASSISTANT DISTRICT COMMERCIAL ENGINEER, Darlington Service Centre. Salary Schedule A, Class F, Grade 5, £995/£1,055.

York Sub-Area

SECOND ASSISTANT DISTRICT COMMERCIAL ENGINEER, Scarborough District. Salary Schedule A, Class E, Grade 8, £790/£835.

Applications stating age, qualifications and experience to be received by the Assistant Secretary (Establishments), North Eastern Electricity Board, G.P.O. Box No. 117, Carliol House, Newcastle upon Tyne, within ten days of the appearance of this advertisement. 2474

FIRST-CLASS OPPORTUNITIES FOR DESIGN ENGINEERS

A LIMITED number of vacancies will very shortly arise with BICC Ltd. at their Prescot works, for ENGINEERS qualified to degree standard with a sound knowledge of drawing office and workshop practice, to undertake specific projects involving original work on the design of low and medium voltage switch and fusegear. Each engineer will operate with a team of competent draughtsmen in a position of seniority offering considerable scope for initiative and enterprise.

The importance of the positions is reflected in the excellent salaries to be offered, which will be in the four-figure range. In addition, there are good prospects for advancement, and conditions of employment are excellent.

Applications, quoting reference P/21, should be addressed to :—

The Works Personnel Officer
BRITISH INSULATED CALLENDER'S CABLES LTD.
Prescot, Lancashire
(Tel. Prescot 6571)

2464

Situations Vacant (continued)

EAST MIDLANDS ELECTRICITY BOARD

Third Assistant District Engineer, Boston District, Lincolnshire Sub-Area

APPLICATIONS are invited from suitably qualified and experienced engineers for the position of THIRD ASSISTANT DISTRICT ENGINEER in the Boston District of the Lincolnshire Sub-Area.

The duties of the appointment will consist of assisting in the planning, construction, operation and maintenance of underground and overhead networks up to and including 11 kV. Applicants should be capable of carrying out distribution schemes from the initial planning stage to final commissioning.

Ability to drive a motor vehicle is essential and the successful applicant will be required to undertake standby duties and reside in or near Spilsby, in which connection accommodation will be available on taking up the appointment.

The salary and conditions of the appointment will be in accordance with the National Joint Board Agreement, Class E, Grade 8 (£790 × £15 to £835 per annum).

Applications giving details of age, education, qualifications, experience and position held, should be forwarded to the Manager, Boston District, Besco House, Market Place, Boston, so as to reach him within fourteen days of the issue of this advertisement. 2459

ABSTRACTOR

METROPOLITAN - VICKERS ELECTRICAL COMPANY LTD. require for their Research Department a man or woman to prepare and edit abstracts, from the technical press, for use by research, design and manufacturing personnel.

Applicants should have reached degree (or equivalent) standard, preferably in Engineering and Physics.

Applications, quoting reference S.10, should be made on the appropriate form, obtainable from :—

Personnel Manager
METROPOLITAN-VICKERS ELECTRICAL CO. LTD.
Trafford Park, Manchester, 17
2468

SHIFT CONTROL ENGINEER

required by MINISTRY OF SUPPLY at Royal Arsenal Estate, Woolwich, London, for operational control of electrical distribution systems, including H.T. and L.T. switching operations, routine checks of A.C. and D.C. feeder equipment, substation maintenance and all incidental work and records (shift work on a 44-hour week).

Qualifications : Recognised engineering apprenticeship and preferably have had practical experience as a Power or Substation Switchboard Attendant, Shift Control Engineer, or similar post. O.N.C. or equivalent qualification desirable. Knowledge of telecommunications an advantage.

Salary £870 (at age 30) to £1,030 p.a.

Application forms from Ministry of Labour and National Service, Professional & Executive Register, Atlantic House, Farringdon Street, London, E.C.4 (quoting P.E.2120). 2458

ELECTRICAL ENGINEERS

required for Engineering Department of Automatic Motor Control Gear Makers in West Midlands due to expansion.

The work comprises the derivation of schematic diagrams, selection and layout of components and issue of manufacturing instructions.

A pension scheme is in operation and assistance towards removal expenses will be paid in approved cases.

Apply in confidence stating age, experience and salary required to—Box 363.

SOUTH OF SCOTLAND ELECTRICITY BOARD

Fife Area

APPLICATIONS are invited for the position of SENIOR ASSISTANT ENGINEER (Meters, Test and Protection) at Fife Area Headquarters, Dunfermline. Salary and conditions N.J.B. Class H, Grade 4 (£1,235 × £30 to £1,325).

The successful candidate, who will be required to live within reasonable distance of Dunfermline, must be a Corporate Member of the Institution of Electrical Engineers and must have had a sound technical training and experience.

Application forms may be obtained from the undersigned and should be returned on or before 8th March, 1958.

G. T. ALLCOCK,
Area Manager.
East Port,
Dunfermline. 2481

MORRIS MOTORS LIMITED

Cars Branch, Cowley, Oxford

Staff Appointment

VACANCY FOR ENGINEER WITH TRAINING AND PRACTICAL EXPERIENCE IN ELECTRICAL AND MECHANICAL INSTALLATIONS AND MAINTENANCE.

Applicants must be primarily versed in electrical theory and have had a thorough practical experience of power units and electrical installations applicable to factory machinery.

Applicants must also have received technical training in mechanical engineering and have a sound knowledge of modern factory machines and mechanical equipment.

Please apply in writing, giving full details of education and experience, to—

THE PERSONNEL AND WELFARE MANAGER
2463

NORTH THAMES GAS BOARD

ASSISTANT ENGINEER (Electrical) required at the Board's Works at Beckton, East Ham, London, E.6.

Candidates should be not more than 40 years of age and should be Corporate Members of the Institution of Electrical Engineers, having had supervisory experience with the installation and operation of heavy industrial equipment, including generation, high-voltage distribution and large industrial motors. A knowledge of the application of electronics in industry would be an advantage.

Starting salary will be in the region of £1,100 per annum according to age and experience.

The successful candidate will be required to join the staff pension scheme.

Applications giving full details to the Staff Controller, North Thames Gas Board, 30, Kensington Church Street, London, W.8, quoting reference ER/414. 2466

TECHNICIANS

required by
THE ATOMIC WEAPONS RESEARCH ESTABLISHMENT, WOOLWICH COMMON,

to carry out inspection duties and to undertake functional testing of assembled electronic equipment.

Recognised apprenticeship or equivalent experience required, and a knowledge of radio and electronic circuitry.

Salary £815 (at age 28 or over) to £944 12s. p.a. Contributory superannuation scheme.

POSTCARDS for application forms to the Senior Recruitment Officer at A.W.R.E., Aldermaston, Berks. Please quote ref. 1713/48. 2434

LONDON COUNTY COUNCIL

Poplar Technical College

LECTURER for Electrical Engineering and Physics Department. Burnham F.E. Salary Scale, £1,200 × £30 to £1,350, plus London allowance.

Application forms from Secretary at College, Poplar High Street, London, E.14, to be returned by 14th March, 1958. (236). 2483

SOUTH-WEST ESSEX TECHNICAL COLLEGE AND SCHOOL OF ART

Forest Road, Walthamstow, London, E.17

ASSISTANT GRADE B required to teach Electrical Engineering subjects. Candidates should be A.M.I.E.E. or Graduate in Electrical Engineering and should be able to teach up to H.N.C. standard. Teaching and/or industrial experience would be an added qualification.

Salary £650 × £25 to £1,025 per annum. Additions for degree (or equivalent) and training. Increments within scale for previous teaching service, approved industrial experience, and war/national service. London allowance payable.

Applications (no forms) giving particulars of qualifications, training and experience should be submitted to the Clerk to the Governors at the College. 2486

COUNTY BOROUGH OF STOCKPORT

Stockport College for Further Education

ASSISTANT LECTURER, Grade B, in the Electrical Engineering Department to teach subjects in National Certificate and Electrical Craft Courses. Experience in industry and in teaching desirable.

Burnham Technical Scale for Assistants Grade B (men) £650 by £25 to £1,025 with additions for graduate qualifications and training allowance. N.J.C. conditions.

Application forms and further particulars from Principal, Stockport College for Further Education, Wellington Road South, Stockport, to whom they should be returned within 14 days of the appearance of this notice. 2497

MERSEYSIDE AND NORTH WALES ELECTRICITY BOARD

DEMONSTRATOR (Female) required in the Board's No. 2 Sub-Area, to be based at Northwich. Salary within range £500/£600 per annum (N.J.C. Grade 1), according to experience and qualifications.

Applicants should possess a diploma in Domestic Science, or other approved certificate. Previous experience in the electricity supply industry would be an advantage, but is not essential.

Appointment subject to medical examination. Pension scheme.

Application forms obtainable from the Manager, No. 2 Sub-Area, Sandiway House, Northwich, Cheshire. Closing date, 5th March, 1958 2477

ASTRAL SWITCHGEAR LIMITED

EXTENSION of sales organisation means the following appointments are shortly to be made :—

TECHNICAL SALES REPRESENTATIVE London Area. Experience of medium/light engineering in L.V. switchgear and allied fields is necessary; experience in negotiating with industrial users, consultants, etc., desirable.

TECHNICAL SALES REPRESENTATIVE Midlands Area. Experience generally as above.

Remuneration includes pension and life assurance scheme; car and expenses provided.

Please write giving full details to General Manager, Alma Road, Enfield. 2331

SOUTH WALES ELECTRICITY BOARD

APPLICATIONS are invited for the position of ASSISTANT ENGINEER in District 223 (Swansea) in the West Central Sub-Area of the Board.

Salary Class F, Grade 8 (£835/£880) of the N.J.B. Agreement.

Applications stating age, present position and salary, qualifications, experience, and three referees, should be addressed to the Secretary (Establishments Section), St. Mellons, Cardiff, so as to reach him not later than Friday, 28th February, 1958. 2416

SOUTH WALES SWITCHGEAR LTD.

Blackwood, Mon.

have vacancies for DRAUGHTSMEN in the High-voltage Switchgear Contract and Diagram Sections of their Drawing Office.

Applications giving full particulars of experience, age and qualifications to the Personnel Manager. 2487

BRITISH KLOCKNER SWITCHGEAR LIMITED
Chertsey, Surrey

TECHNICAL SALES ENGINEERS required for London and Home Counties. Knowledge of motor control gear; sales experience preferred but not essential. Apply giving full particulars to—Managing Director. 166

A YOUNG man with commercial outlook and sound electrical engineering background is required for interesting work in sales organisation. Technical education to Grad. I.E.E. or H.N.C. is preferred, but live personality and ability to correspond in good English are essential. Write with full details to—Sales Controller, Gresham-Lion Group, Gresham House, Twickenham Road, Hanworth, Middlesex. 2436

APPLICATIONS are invited from suitably qualified engineers (25/35 years of age) capable of preparing complete electrical schemes for lighting, heating and power, including substation layouts and distribution for industrial undertakings. Only fully experienced engineers should apply. Salary £850/£950 p.a. Permanency. Apply — Christy Bros. Limited, Chelmsford. 2421

APPLICATIONS are invited for position of technical sales engineer for London and Southern England. Applicants must have good electrical engineering background and basic knowledge of motor control equipment in all its applications, and must have good existing connections with users in the area concerned. Please write giving full particulars to Sales Director.—Box 2279.

ARMATURE winder. Progressive firm requires for repair shop winder having sound knowledge all types A.C. and D.C. work. This company has other activities and there are good prospects of advancement for skilled man with initiative and some administrative ability. Write to—Service Electric Co. Ltd., Honeypot Lane, Stanmore, Middx. 2403

ASSISTANT works manager required for electric cable works, paper-insulated section. Reply with full details of past experience to the Managing Director, Sterling Cable Company Ltd., Aldermaston, Berkshire. 2251

BRITISH ENGINE BOILER & ELECTRICAL INSURANCE Co. Ltd., 24, Fennel Street, Manchester, 4. Electrical surveyors required for various districts in Great Britain. Permanent positions carrying progressive salary scale £735 to £1,060 and non-contributory pension. Candidates, age 26 to 32, preferably with H.N.C. in Electrical Engineering or Grad. I.E.E., and with apprenticeship in manufacture or repair of electrical machinery, are invited to apply in own handwriting, stating age, qualifications and experience. 2473

BRUCE PEEBLES & Co. Ltd. have a vacancy for a technical sales engineer in their rotating plant sales (quotations) department. 5-day week, staff pension and production bonus schemes. Assistance with removal expenses and house purchase where necessary. Applications stating age, qualifications and experience to Manager Rotating Plant Department Edinburgh 5, quoting reference FH/Sales. 2437

BRUSH ELECTRICAL ENGINEERING Co. Ltd. invites applications for the position of senior designer of extra high voltage switchgear. Applicants should have had a good engineering education and practical training with previous experience in the design and testing of switchgear. A good salary will be paid commensurate with the importance of this appointment. Applications should give particulars of past experience, qualifications, etc., and shou'd be addressed to the Chief Personnel Officer, Brush Electrical Engineering Co. Ltd., Loughborough, Leics., and should quote ref. SD.7345. 2453

CANADA. Expanding company near Montreal needs an engineer with experience in the design of oil and dry type transformers between 250 and 100,000 kVA. Attractive salary for an applicant qualified to become chief of the transformer design department after a few years. Passage paid by employer. Interviews with our representative who is at present in England can be arranged immediately. Please apply in confidence, to—Box 9278.

CONSULTING engineers require junior electrical engineers and draughtsmen. Apply giving details of qualifications, experience and salary required to—Box 160.

CIRCUIT design draughtsmen required by company manufacturing industrial control equipment. Good salaries paid to "first-class" men. Canteen facilities, pension scheme. Housing assistance considered in approved cases. Write giving age, experience, etc., to—Personnel Officer, Dewhurst & Partner Ltd., Inverness Works, Inverness Road, Hounslow, Middx. 273

CONSULTING engineers require urgently junior electrical draughtsmen conversant with lighting and power designs for industrial building schemes. Good conditions, site visits, non-contributory pension scheme, bonus scheme, luncheon vouchers, etc. Write or phone—Messrs. A. F. Myers & Partners, 147, Victoria Street, London, S.W.1 (TAT. 8241). 2438

CONTACTOR designer required, preferably with experience on contactors up to 400 volts and currents of up to 1,600 amps. Reply in strict confidence to—Box 2332.

CONTRACTING manager responsible for installations, service and maintenance of electrical, fire and burglar alarm contracts, with knowledge of electronics preferred, for old-established London company. Attractive appointment with prospects for the right man. Salary in keeping with experience. Apply with details of experience to—Box 2422.

DESIGNER. Highly progressive and expanding electric motor manufacturing company in the West of England require an electrical designer experienced in the design of induction motors from f.h.p. up to 600 h.p. ranges. Housing and pension schemes. Write with details of experience, salary range, etc., to—Personnel Manager, Newman Industries Ltd., Yate, Bristol. 2469

DESIGNER required for development work on low-voltage air circuit breakers. Reply in strict confidence to—Box 2333.

DEWHURST & PARTNER Ltd. require technical estimator for preparing tenders in their estimating engineering department. Applicant must have good electrical engineering background and have basic knowledge of motor control equipment and its applications. The position is a senior one, and housing assistance will be given to successful applicant if necessary. Canteen facilities, pension scheme. Write giving age, experience, etc., to — Personnel Officer, Dewhurst & Partner Ltd., Inverness Works, Inverness Road, Hounslow, Middlesex. 274

EDITOR required for monthly technical publication, wide circulation. Must be expert in attractive typography and layout, able to write special articles and to rewrite, condense or expand other material. Applicants must be qualified engineers or scientists and subsequent journalistic experience is desirable. A three-year contract would be considered. Commencing salary £1,250 to £1,500 according to qualifications and experience.—Box 2492.

ELECTRIC element manufacturers require experienced technician for development and production for industrial application. Progressive post for keen young man. S.W. London. Please write stating age, experience and salary expected.—Box 2439.

ELECTRICAL engineer required in London area for the design of electrical installations in all types of buildings. Must be capable of running a project through all its phases including site supervision. Write giving full details of qualifications, experience and salary required to Box ER 784 LPE, Romano House, 399/401, Strand, London, W.C.2. 2490

ELECTRICAL engineers required for development work on capacitors. Those interested in problems of insulation and dielectrics which offer great scope for experimental research should write to—Stability Capacitors Ltd., Raven Road, London, E.18. 2334

ELECTRICAL test engineers are required at the E.D.A. Testing House, Leatherhead, Surrey, where this National institution has modern laboratories which test for safety and performance all types of domestic appliances, agricultural and light industrial equipment on behalf of the electricity boards and the British Standards Institution. Applicants should have previous experience in an electrical testing laboratory and a knowledge of the design of domestic electrical appliances would be advantageous. Higher National Certificate or similar qualification is required. Salary within the range £810/£935 per annum. Canteen facilities are available and there is a voluntary pension scheme. Write stating age, qualifications and experience to Director, British Electrical Development Association, 2, Savoy Hill, London, W.C.2. 2493

ELECTRICAL engineer required, aged 25 to 40, capable of designing and supervising electrical engineering installations for all types of buildings. Apply, with details of experience and salary required, to — J. Stinton Jones and Partners, Consulting Engineers, 21, Gloucester Place, London, W.1. 2348

ELECTRICAL wholesalers (E.W.F.) require two experienced representatives with established connection in the industry. One for the London and Greater London area, and one for Luton and surrounding area. Existing accounts will be given to suitable applicants. Own staff notified. Reply with brief particulars. In strict confidence.—Box 2494.

ELECTRO-mechanical draughtsmen required for production drawing office of company engaged in the manufacture of control gear equipment. Good salaries paid to "first-class" men. Canteen facilities, pension scheme. Housing assistance considered in approved cases. Write giving age, experience, etc., to—Personnel Officer, Dewhurst & Partner Ltd., Inverness Works, Inverness Road, Hounslow, Middx. 275

ELECTRONIC engineer with good technical background required for repair and maintenance of electronic equipment in a well-known biscuit manufacturing company in Capetown, South Africa. The position offers good future prospects with pension fund, monthly salary and annual leave in South Africa. Assisted passage paid to South Africa. A married man would be preferred, in which case the company would consider meeting him with respect to the family passage money. Apply giving full details of training and experience and salary required.—Box 2440.

ENGINEER-draughtsmen required by well-known electrical instrument, time switch and meter manufacturers who are expanding their engineering section. Keen men wanted with initiative and ability to design small electric mechanical devices, and to supervise the production of models. Good salary for experienced men, 5-day week, pension scheme. Please write stating experience to — Chief Draughtsman, Sangamo Weston Ltd., Great Cambridge Road, Enfield. 2441

IMPERIAL CHEMICAL INDUSTRIES Limited, Plastics Division, has a vacancy for an electrical engineer. Appointment will be to either the Headquarters staff at Welwyn Garden City or at the Division's Hillhouse factory located near Blackpool (Lancs). Applications are invited from men in the age range 28/35, holding a degree in electrical engineering or, alternatively, Associate Membership of the I.E.E. It is essential that candidates should have had some years' experience of industrial plant, preferably in the chemical field. An attractive starting salary will be offered to the selected applicant, beyond which there is plenty of scope for progressive remuneration. The appointment carries membership of the staff pension fund and a profit-sharing scheme is in operation. For married men special mortgage facilities can be granted towards house purchase, and assistance is given towards removal expenses. Temporary lodging allowance also available for married men. Apply briefly to the Staff Manager, Imperial Chemical Industries Limited, Plastics Division, Black Fan Rd., Welwyn Garden City, Hertfordshire. 2435

IMPERIAL CHEMICAL INDUSTRIES Limited, Plastics Division, has immediate vacancies for electrical draughtsmen in the Chief Engineer's Department at Welwyn Garden City. Candidates must have served a recognised apprenticeship, and should hold the Ordinary National Certificate. Experience of factory and general industrial installation work would be useful. An attractive starting salary will be offered to the selected applicants, beyond which there is plenty of scope for progressive remuneration. The appointments carry membership to the staff pension fund and a profit-sharing scheme is in operation. For married men special mortgage facilities can be granted towards house purchase, and assistance is given towards removal expenses. Temporary lodging allowances are also available for married men. Apply giving full particulars to the Staff Manager, Imperial Chemical Industries Ltd., Plastics Division, Black Fan Road, Welwyn Garden City, Herts. 2405

JUNIOR electrical engineer required in London area to assist in designing of electrical installations in all types of buildings. Scope for advancement for suitable man. Write giving full details of qualifications, experience and salary required, to Box ER 785, LPE, Romano House, 399/401, Strand, London, W.C.2. 2491

***Situations Vacant** (continued)*

JUNIOR engineer required capable of assisting in the preparation of complete electrical schemes and estimates for lighting, heating and power in industrial buildings. Apply with full particulars to—Christy Bros. Limited, Chelmsford. 2420

JUNIOR sales engineer required for transformers and capacitors in Midlands and Southern England. Salary, commission and expenses.—Box 2442.

JUNIOR technical assistant required for investigational work in cable factory. H.N.C. preferred but O.N.C. with some experience would be considered. Apply giving age, qualifications and experience to—Box 2367.

JUNIOR technical engineers and draughtsmen required for work on design of electrical engineering installations for hospitals, colleges, factories, etc. (5-day week). Salary dependent upon age and experience. Apply, with details, to—J. Stinton Jones and Partners, Consulting Engineers, 21, Gloucester Place, London, W.1. 2349

LONDON plastic cable manufacturers require travellers. Write full details, age, experience, territory covered.—Box 2423.

OPPORTUNITY offered to young man with electrical background to join the sales staff of an established firm of electric motor manufacturers in London.—Box 2351.

REPRESENTATIVE for Yorkshire for TEMCO wiring accessories. Good salary, commission, expenses, for experienced man with personality and contractor connection. Car provided. Pension scheme. Write in confidence stating experience, age, remuneration required, to—Mr. S. M. Harris, T.M.C.-Harwell (Sales) Ltd., 37, Upper Berkeley Street, London, W.1. 2311

REQUIRED for South Wales by well-known firm, young electrical engineer as technical representative with particular reference to control gear and small transformers. Some mechanical knowledge an advantage. Must be car driver. State age, qualifications, salary required to—Box 2470.

SALES engineer for London area. Salary £900/£1,000 plus commission. Excellent opportunity for promotion. Electrical engineering apprenticeship an advantage but not essential. Apply in confidence stating age, qualifications and past experience.—Box 2408.

SALES order clerk required, senior post. Well paid position offering scope in the future. Superannuation scheme. Canteen and social club facilities. Experience of electrical wholesaling essential. Apply—Managing Director, Halsey's Electric Co. Ltd., Brandon House, Wyfold Rd., London, S.W.6 (Tel. Fulham 3355). 2409

SCOTTISH manufacturer requires man to take charge of fitting and assembly shops making domestic products. Knowledge of modern production methods essential and preferably experienced in the manufacture of electrical goods. House could be made available.—Box 2472.

SUPERVISOR with experience of mains cable laying, cable jointing, control of labour and records, including wages. Write stating age and full details of experience to—Box 2454.

SURVEYOR required for wood pole line contract in Inverness area. Good salary and subsistence to right man. Apply in writing to — B. French Limited, Pike Mills, Kidderminster. 2352

SWITCHGEAR sales engineer (inside) required to deal with enquiries and orders for a wide range of substation and power station switchgear. Applicants should have a fair knowledge of switchgear requirements and should state their technical qualifications and practical experience. Apply in first instance to the Personnel Officer, Ferguson Pailin Ltd., Higher Openshaw, Manchester, 11. 2455

SWITCHGEAR sales engineers required, preferably with H.N.C. or higher qualifications and with experience in tendering for E.H.V. switchgear installations and power station auxiliary applications. Applications to give age, education and full details of experience, together with salary required, to—Personnel Manager, South Wales Switchgear Ltd., Blackwood, Mon. 2371

CLASSIFIED ADVERTISEMENTS ARE PREPAID

SWITCHGEAR draughtsman with sales flair or experience wanted for old-established London switchgear company. Excellent opportunity for young and ambitious man. Salary and bonuses in keeping with capabilities and results. Write with details please in confidence to Box 2444 stating experience and qualifications.

TECHNICAL engineer required in development department of cable works. University degree essential and should have completed National Service. Some experience of cable and dielectric problems an advantage. Apply giving full details to—Box 2368.

TESTER of automatic electric control equipment required. Interesting work with good prospects. O.N.C. standard preferred. Five-day week, pension scheme, canteen facilities. Please write giving full details of age, previous experience, qualifications, etc., to — Personnel Officer, Dewhurst & Partner Ltd., Inverness Road, Hounslow, Middlesex. 277

THE TELEGRAPH CONSTRUCTION & MAINTENANCE Company Limited, cable manufacturers in the S.E. London area, require a technical assistant in their cable design and specification section for the preparation of designs and to provide technical information concerning cable accessories. A salary of £750 upwards is offered to suitable applicants. Apply to—Personnel Manager, Telcon Works, Greenwich, London, S.E.10. 2445

THE TELEGRAPH CONSTRUCTION & MAINTENANCE Co. Ltd. require a technical sales representative to work from its London office. Applicants, preferably between 25 and 35 years of age, should have outside cable selling experience in London and the Home Counties. In addition a knowledge of industrial plastics would be an advantage. Excellent conditions of employment. Please apply with full details to—Home Sales Manager, The Telegraph Construction & Maintenance Co. Ltd., Mercury House, Theobald's Road, London, W.C.1. 2446

TWO lighting sales representatives required for London area. Only salesmen experienced in selling to industrial and commercial users with proved sales records may apply. Salary and commission. Car provided or contribution made to car owners. Apply to—Secretary of Ensel Electric Co. Ltd., 3, Eden Grove, London, N.7 (Phone, North 5866). 2415

WEATHERLEY OILGEAR Ltd. require an electrical engineer for their drawing office electrical division, with prospects of taking charge. Minimum qualification H.N.C. Write in confidence, giving details of experience, qualifications, age and salary required, to—Personnel Officer, Weatherley Oilgear Ltd., Dells Lane, Biggleswade, Beds. 2411

APPOINTMENTS FILLED

Dissatisfaction having so often been expressed that unsuccessful applicants are left in ignorance of the fact that the position applied for has been filled, may we suggest that Advertisers notify us to that effect when they have arrived at a decision? We will then insert a notice free of charge under this heading.

SITUATIONS WANTED

ADVERTISER desires situation as service engineer/agent for some electrical or electro-mechanical product. Own car. Based Gloucestershire.—Box 9276.

BRANCH manager, electrical wholesale, 25 years' experience all departments, seeks change, London area, where drive and initiative will be suitably rewarded.—Box 9275.

B.Sc., A.M.I.E.E., 20 years' experience applications motors, automatic control gear, tenders, estimates, installation, administration, seeks change.—Box 9257.

ELECTRICAL engineer (contracting) seeks senior appointment with reputable company, where drive, initiative and real ability are essential qualifications.—Box 9262.

ELECTRICAL engineer having spent the last ten years in the East desires change. Estimating, planning, supervision of power and lighting installations, power houses, factories, public buildings, o.h. & u.g. distribution systems. Prepared to travel home or abroad.—Box 9259.

ELECTRICAL engineer, 30 years in East, desires work in Home Counties. Design, specifications, supervision of power, lighting and air conditioning installations for factories, laboratories, multi-storey buildings.—Box 9266.

ESTIMATING and supervising engineer desires change.—Box 9263.

ELECTRICAL engineer, Scot (32), married, excellent health, H.N.C., Heriot Watt, Edinburgh, wishes responsible overseas position with reputable organisation. Has sound knowledge of repair, fault location, installation and maintenance of A.C. and D.C. machinery and control gear. Advertiser spent four years in Middle East engaged on fault location and repairs of all sizes and types of equipment, also power station installation work, including all controls, auxiliaries, etc., in M.I.C.C. Is interested in foreign languages and speaks Farsi fluently. At present resident in New Zealand, but could arrange for interview at any particular place.—Box 9264.

RESISTANCE welding, industrial electronics, general electrical plant maintenance. Technician/supr. (34), O.N.C., desires change, any capacity. Midlands pref.—Box 9273.

STORES clerk (39), Electricity Board, Grade 2, seeks post in other Board with scope for advancement. Thoroughly acquainted all stores procedure to District level.—Box 9254.

TECHNICAL sales engineer (43), 20 years in Midl'ds present co., seeks change.—Box 9258

WORKS manager estab. rewind/repair works (32) seeks similar position.—Box 9265.

YOUNG electrical engineer, aged 25, apprenticed, passed installation and technology exams., experienced with light and heavy electrical plant installation and maintenance, studied term of estimating on electrical work. Keen to obtain good position. London area preferred. —Box 9261.

YOUNG man aged 28 with 14 years in electrical contracting, including experience at ordering and pricing, seeks position as trainee estimator, London area.—Box 9268.

ARTICLES FOR SALE

LARGE A.C. MOTORS

3-phase, 50 cycles

Maker.	h.p.	Volts.	r.p.m.
B.T.H.	1820	3.3 kV	368
B.T.H.	1800	400/440	368
B.T.H.	1400	6.6 kV	368
MATHER & P.	350	400/440	730
MATHER & P.	300	400/440	750
B.T.H.	250	400/440	480
BRUSH	250	400/440	420
E.C.C.	175	400/440	580

Reconditioned and guaranteed.

THOS. W. WARD LTD.
Albion Works, Sheffield
Phone 26311 (ex. 347)
Grams: " Forward, Sheffield " 321

NEW TRANSFORMER WELDERS

20/300 amps., 250 amps. and 160 amps.

OIL-cooled pattern Arc Welders for operation on 400/440 volts, single-phase, 50 cycles; alternatively 230 volts, single-phase, 50 cycles; dual welders voltage 50/80; output current variable between 20/300 amps., fitted with coarse and fine regulators in robust steel tank. £85.

Similar 250-amp. units, £71.

Similar 160-amp. units, but not fitted with wheels, £45.

GEORGE COHEN SONS & CO. LTD.
Wood Lane, London, W.12
(Tel. Shepherds Bush 2070) and
Stanningley, Nr. Leeds
(Tel. Pudsey 2241) 2471

185-kW RECTIFIER

with 6-phase transformer and auxiliary equipment. G.E.C. air-cooled, steel tank, pumpless type, mercury arc rectifier, D.C. output 800 amp., 230 volt, cont. Can be seen working.

PETE ELSTUB LTD.,
Mitchell Street,
Keighley
(Tel. 3418). 2495

ELECTRIC HOUSE SERVICE METERS

PREPAYMENT and credit, 200/250 v. A.C., s/p., 50 c., 2½-100 A. Fixed or variable tariff. Reconditioned, fully tested and guaranteed 2 years. Prompt delivery, carriage paid.

ALBERICE METER COMPANY
Fairfax Works, Fairfax Rd., London, N.8
(Tel. MOUntview 7944, 6373) 191

A.C. and D.C. motors, generators, from stock.—Service Electric Co. Ltd., Honeypot Lane, Stanmore, Middx. (Edgware 5566/9). 91

ABABCOCK & Wilcox water tube boiler will cut down your fuel costs; we can supply from stock. Two 40,000 lb. evap., 220 lb. w.p.; one 25,000 lb. evap., 200 lb. w.p.; 3,000 lb. evap., 400 lb. w.p.; Spencer Bonecourt boiler; also Marine, Cornish vertical, etc.—Burford, Taylor & Co. Ltd., Boiler Specialists, Burtayco House, Church Street, Middlesbrough (Tel. Middlesbrough 2622). 122

A.C. and D.C. 1/- Slotmeters. Guaranteed 2 years, 2½-50 amps. From 50/-. Repairs and recalibrations. See Billiard: Tradex Meter Co., Surbiton (Tel. Elmbridge 4487). 169

ALTERNATORS from ½ to 675kVA in stock, single and three-phase, all voltages and frequencies. Guaranteed. Many unused. Send your requirements.—Fyfe, Wilson & Co. Ltd., Station Works, Bishop's Stortford. 162

ALTERNATORS, generators, 1-100 kVA, all voltages. Specialists—Powerco Ltd., 312, York Rd., London, S.W.18 (VAN. 5234). 147

ALTERNATORS. Surplus to requirements on account of change in design of our generating plants. Attractive prices. 0.5 kVA to 25 kVA. Send for list and also details of our comprehensive range of diesel and petrol generator plants from 0.5 kVA to 200 kVA.—Dale Electric (Yorkshire) Ltd., Filey, Yorks. (Phone 2301-3). 2049

ALTERNATORS, 3-phase, all sizes in stock from 7 kVA up to 330 kVA.—Britannia Manufacturing Co. Ltd., 20/26, Britannia Walk, London, N.1 (CLErkenwell 5512). 24

BARGAINS in electric motors are always being obtained from A. Cooksley & Co. Ltd., 21/25, Tabernacle Street, London, E.C.2. Stocks include A.C. and D.C. motors, second-hand and new up to 30 h.p. Starters, slide rails and pulleys. Ring Mon. 3355 for your requirements. 50

BILLIARD Meters. 1/-, 6d. or 1d. slot. All time settings. From 140/-. See Quarterly.—Tradex, Surbiton. 170

CABLE, underground, all types ex stock.—E. M. Tatton Co. Ltd., Kew Bridge, Brentford (EALing 3155/6). 117

CABLE, underground, PILC/VIR/LC, ex London stock. Cutting orders same day delivery London area. Send for priced stock lists.—Batt Electrical Co., 6, Dock Street, London, E.1 (Tel. ROYal 5905). 316

CIRCUIT breakers, various sizes in stock, A.C. and D.C., 200 amperes up to 2,000 amperes. Also dynamo and alternator switchboards.—Britannia Manufacturing Co. Ltd., 22/26, Britannia Walk, London, N.1. 26

CONVERTERS, 110 and 220 v. D.C./230 v. A.C., .5 to 6kVA; also A.C./D.C. Special voltages at short notice.—Powerco Ltd., 312, York Rd.. London, S.W.18 (VAN. 5234). 150

CRANE motors. Direct current, series wound or compound wound, all voltages. We have large stocks.—Britannia Manufacturing Co. Ltd., 22/26, Britannia Walk, London, N.1. 22

DIESEL generating sets, all sizes to 500 kW. Britannia Mfg. Co. Ltd., Britannia Walk, London, N.1. 16

EIGHT 200-amp. changeover switches, back-of-board mounting, front-of-board operation. Immediate delivery, £30 10s. each.—A. C. Dibley & Co. Ltd., 72, Granville Road, London, N.W.2. 2443

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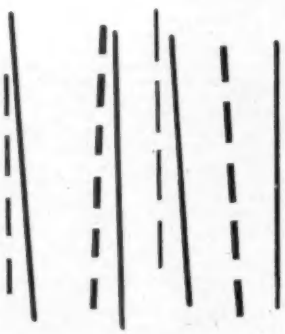

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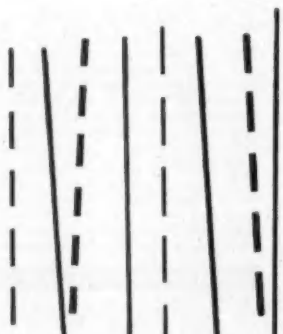

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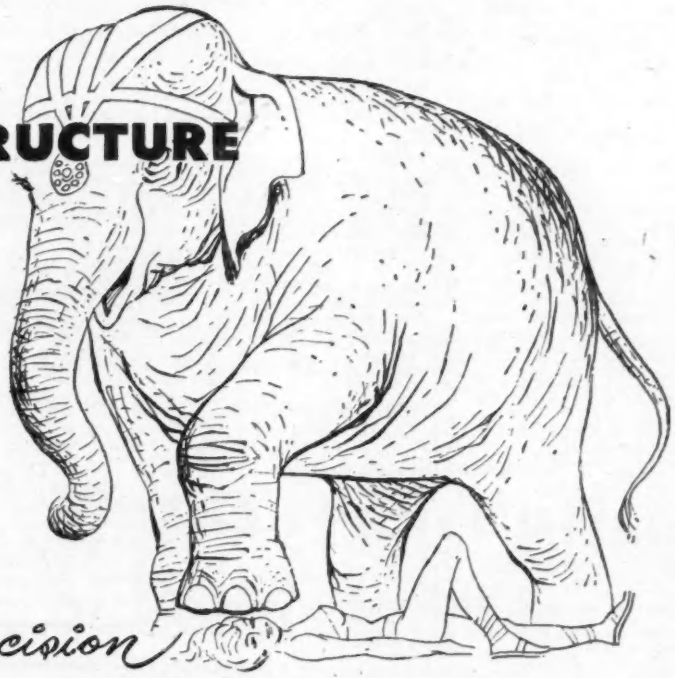

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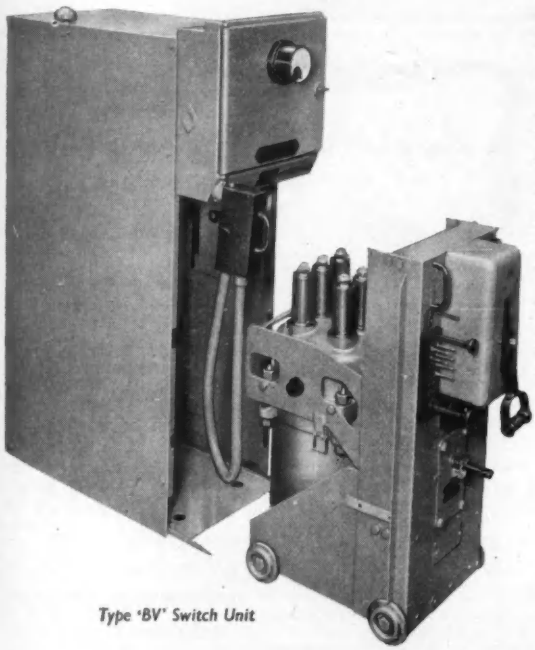

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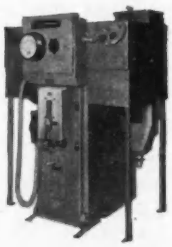

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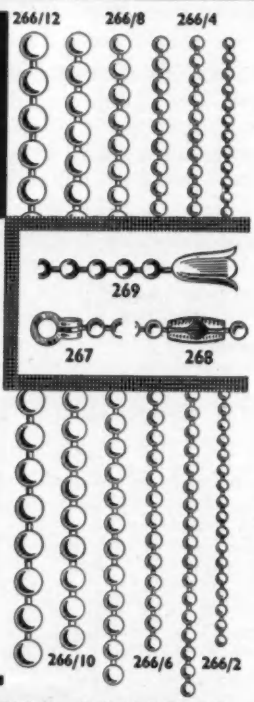

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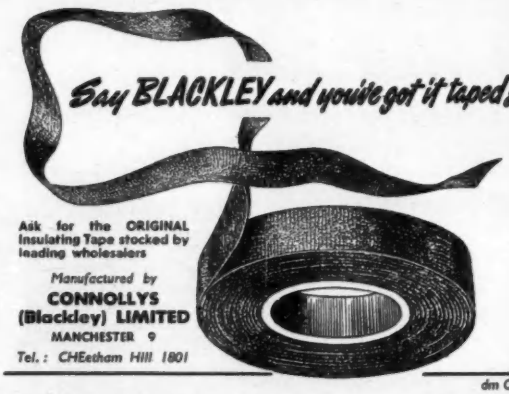

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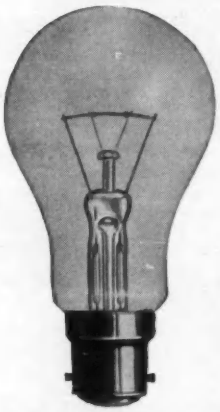

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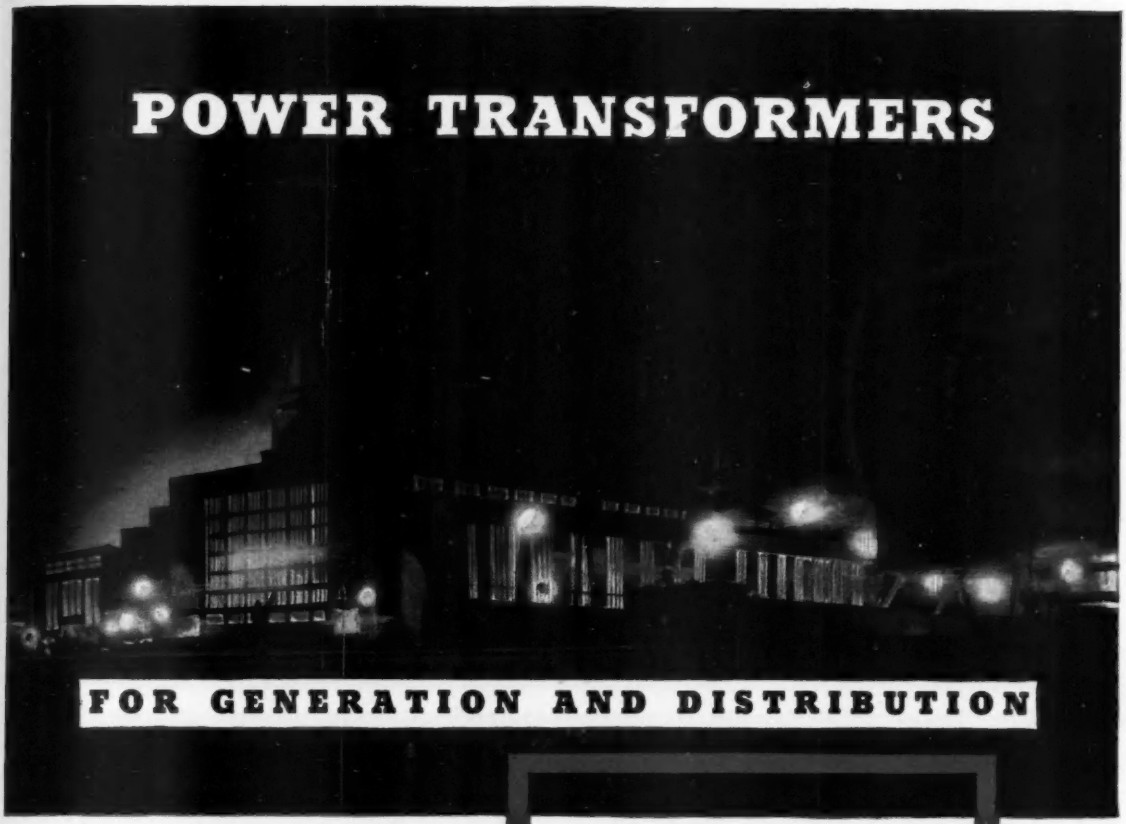

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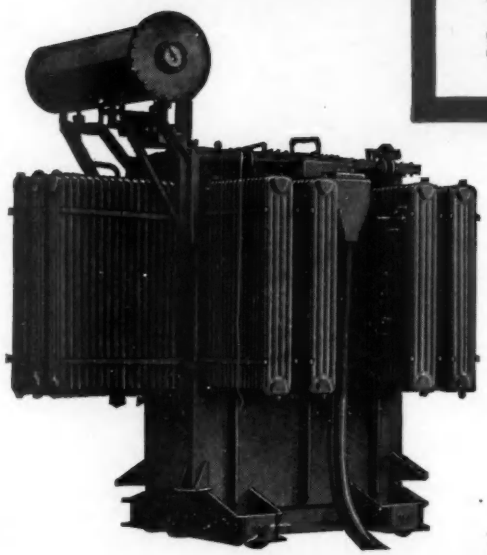

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